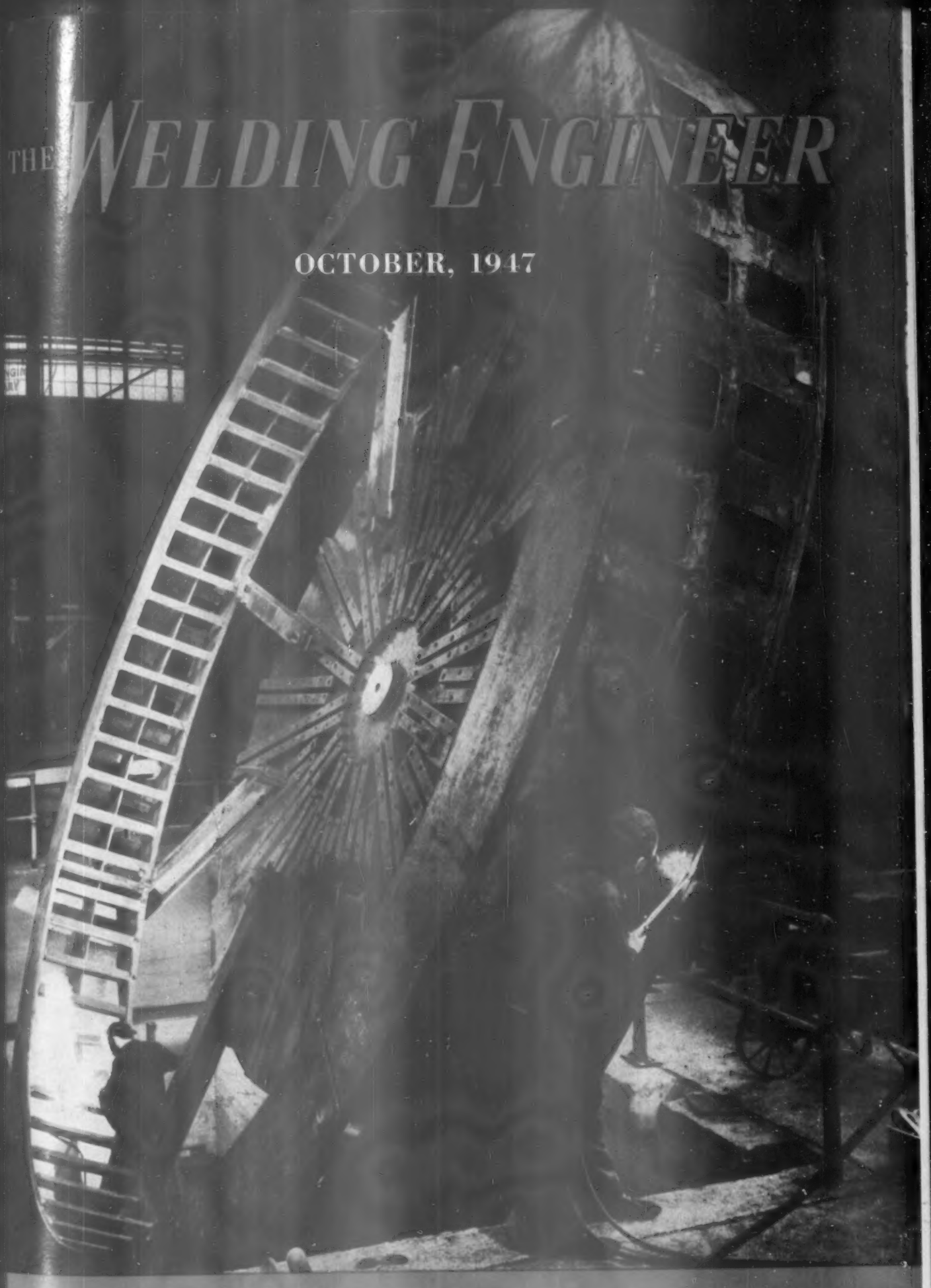
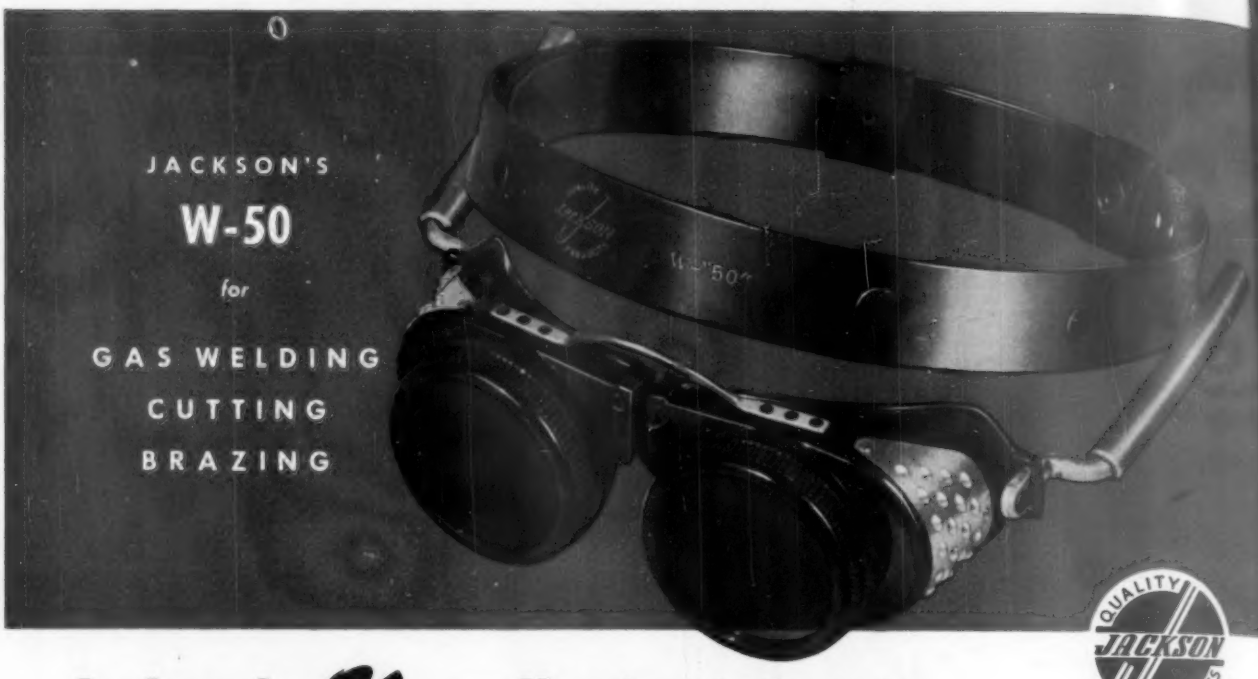
THE WELDING ENGINEER

OCTOBER, 1947



CONVENTION AND METAL SHOW NUMBER

A McGRAW-HILL PUBLICATION



Jackson's *New* Headrest Goggles

• Light and Easy to Wear • Simple and Easy to Adjust • Practical and Easy to Raise and Lower

LENSES, standard 50 mm. size, are available in shades from 3 through 8. They are held in individual eye cups. Cover glasses protect the filter lenses from pitting.

EYE CUPS are of moulded plastic, joined together flexibly, so they may be easily fitted against the face of the wearer. The outside of each eye cup has ventilating screen, and baffle plate, which prevent fogging, yet keep flying particles and stray light rays from reaching the wearer's eyes.

GOGGLE ASSEMBLY is hinged from the sides of the headrest by telescopic arms. Concealed springs hold goggles gently against the face.

HEADREST distributes the weight over the entire head. It is of light, easy to clean plastic and easily adjusted to any head size. Sweatband adds to the wearer's comfort.

Goggles in protective position. They may be worn over prescription glasses.

To raise goggles, pull forward and up in one operation. Prescription glasses do not interfere.

In "off-guard" position, goggles rest against headrest, are put "on-guard" again in less than a second.

For WELDING, available in two types:

Type W-50, as shown above, with plastic headrest and telescopic arms.

Type WR-50, same goggle assembly furnished with elastic head band.

Also available for CHIPPING AND GRINDING:

Type G-50 as shown above, but without baffle plates. Clear, hardened lenses.

Type GR-50, same goggle assembly furnished with elastic head band.

JACKSON PRODUCTS

31739 Mound Road, Warren, Michigan

THE WELDING ENGINEER

THE WELDING ENGINEER, *with which is combined The Acetylene Journal*

A McGRAW-HILL PUBLICATION

Volume 32 - Number 10 *October, 1947*

A. M. Morris, *Publisher*
T. B. Jefferson, *Editor*
Clyde B. Clason, *Managing Editor*
John H. Giroux, *Associate Editor*
W. R. Dawson, *Art Director*
Slade Kennedy, *Research Associate*
Henry W. Young, *West Coast Space Editor*
Donald D. Hogate, *Chief Washington Bureau*
John Chapman, *World News Director*

T. E. Depew
Eastern Manager, New York, Tel. Me 3-0700

E. J. McOsker
Central Manager, Hanna Bldg., Cleveland, Tel. Main 3981

Joseph H. Allen
Western Manager, Chicago, Tel. Whitehall 7900

Roy Phelan
621 *S. Hope Street, Los Angeles, Calif., Tel. Michigan 3873*

John Otterson
68 *Post Street, San Francisco, Calif., Tel. Douglas 4600*

John Doyle
Assistant to Manager

COPYRIGHT 1947 All rights reserved
McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW
Founder and Honorary Chairman
JAMES H. McGRAW, JR.
President
CURTIS W. McGRAW, *Senior Vice-President and Treasurer*
JOSEPH A. GERARDI, *Secretary*
EUGENE DUFFIELD, *Editorial Assistant to the President*
NELSON BOND, *Director of Advertising*
J. E. BLACKBURN, JR.
Director of Circulation

PUBLICATION OFFICE, 210 S. Desplaines St., Chicago 6. EDITORIAL OFFICE, 520 No. Michigan Ave., Chicago 11. EXECUTIVE OFFICES, 330 West 42nd St., New York 18, N. Y.

Return postage guaranteed. Branch offices, Chicago, San Francisco, Washington, Philadelphia, Cleveland, Detroit, Pittsburgh, St. Louis, Boston, Atlanta, Los Angeles. Published monthly.

McGraw-Hill Publishing Company, Inc. Application for entry as second class matter at Chicago is pending under the act of March 3, 1879.

Subscription rates:

Single copy 50c. United States and possessions $5.00 per year, $8.00 for two years, $10.00 for three years. Canada $6.00 per year, $10.00 for two years, $12.00 for three years. Pan American countries $10.00 per year, $16.00 for two years, $20.00 for three years. All other countries $15.00 per year, $25.00 for two years, $30.00 for three years.

IN THIS ISSUE

COVER: *A large hydraulic welding positioner in the tank and plate shops of Allis-Chalmers Mfg. Co. facilitates fabrication of the huge 39,000-kva water wheel generator yoke for Fort Peck. This piece weighs 25 tons and has an outside diameter of 38 ft. 8 in.*

AWS Meets in Chicago 51

Tentative Program for 28th Meeting 52

1947 Metal Show 63

Design

Conversion to Welded Construction 33
OMER BLODGETT

Construction

Laying the "Biggest Inch" Pipe Line 42

Production

Welding Railroad Passenger Cars—I 44
A. M. UNGER

Spot-Welded Display Signs 59

World's Largest Press Brake 68

Distributors—6

Distributor for Distributors 54
CLYDE B. CLASON

Operation

Flux-Injection Cutting—II 60
G. E. BELLEW

Causes and Cures for Hot Welding Cables 70
R. L. TOWNSEND

Training

Education for Welding Personnel—II 64
WALTER J. BROOKING

DEPARTMENTS

Editorial 31

News of the Industry 72

Engineering Data Sheet No. 85 83

Free Literature 85

About People 88

New Products to Use 94

From the Patent Office 112

Opportunities for Welding 124

Searchlight Section 129

Where to Buy Section 129

Advertisers in This Issue 130

PAGE *Welding* ELECTRODES

C+X=S
WHERE:
C= COMPLETE RANGE OF ELECTRODES AND GAS WELDING RODS
X= EXPERIENCED FIELD SERVICE MEN TO RECOMMEND CORRECT RODS AND TECHNIQUES
S= SAVINGS IN WELDING COSTS

This is the PAGE formula for economy in production welding. The uniformly high quality of PAGE welding electrodes and rods is not included, because that is simply taken for granted by experienced welders.

Through PAGE Field Service Men, your PAGE distributor can give you valuable up-to-date information on welding techniques and selection of electrodes. That's why we say . . .

Get in Touch with Your PAGE Distributor

ACCO

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

ESTABLISHED 1916

THE WELDING ENGINEER

OCTOBER, 1947

Don't Price Welding Out!

PRICES continue to go up, *up*, UP! And there is little that can be done about the ever rising price spiral so long as wages are forced up without corresponding boosts in production.

Labor isn't gaining, either, from this dog-chasing-its-tail sort of business. A worker may have more money to take home, but what's the good of that if his pay envelope buys less? The unhappy deadlock will be broken only when the worker is willing to produce more for more pay. Then prices will go down as production rises.

More production for more pay is especially important in welding. Admittedly, a greater number of people are sold on welding than ever before, but they are not sold sufficiently to pay a premium to have a welded product. If our industry is to continue its recent healthy rate of growth, it must keep welding from being priced out of the picture.

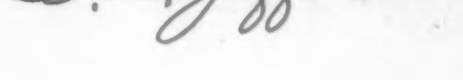
In the building field, for example, increased wages and limited production are reflected in the present outlandish prices of new homes and buildings. Because there doesn't happen to be a ready substitute for bricks, a bricklayer is able to get away with laying only 400 bricks a day when he used to feel ashamed if he couldn't lay 1,600 in the course of a normal day's work. A weldor, however, can't successfully imitate the same tactics. If he tries to limit his output to 5 to 8 lb of rods deposited downhand when a normal day's production is five times that, he's liable to run into trouble because there are competitive means of fastening that may be substituted for welding.

Welding already has one strike called on it in the building field by certain featherbedding rules which require "displaced" workers to take it easy in the shade when a weldor is on the job. That's a bad handicap; it very nearly prices welding out of the picture right off the bat. If the weldor then refuses to do a fair day's work, he may easily find out that his services won't be wanted. Then we'll all suffer.

To look at the coin from its opposite side, this period of high prices and low production offers a golden opportunity to those engaged in welded fabrication. Welding *can* increase production, can make it possible to reduce overall costs, can help to give the worker his increased wages and the customer superior products at lower cost. Those engaged in welded production should bear this in mind—and let low-production workers in other industries give welding a boost through the horrible contrast they afford.

It will be smart business to sell welding at a figure that will lead more people to buy more welded products. By doing this, we will insure the future of welding.

Let's keep welding in the picture by keeping it priced right.



Our new booklet—"Murex Arc Welding Electrodes"—contains 89 pages of useful information—surveys the development, manufacture and use of the complete Murex line. Booklet contains:

ELECTRODE GUIDE

Indicates briefly which Murex electrode to use for a particular welding application—gives recommended procedures for obtaining best results.

MUREX DISTRIBUTION POINTS

A handy reference list gives the location of all district offices and distributors from which Murex electrodes may be purchased—or where information or assistance in solving welding problems may be had.

COMPLETE TECHNICAL DATA

A general description of each electrode is given—together with specifications, physical properties, chemical analysis of deposit and recommended currents. There's a wealth of other material, too—including numerous illustrations and charts showing typical successful applications, and a list of welding accessories.

Here's a sure way to simplify the problem of selecting the *right* electrode for a particular welding job. To get your *free* copy of this helpful booklet, fill in and mail coupon today.

METAL & THERMIT
CORPORATION
120 BROADWAY, NEW YORK 5, N. Y.
Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

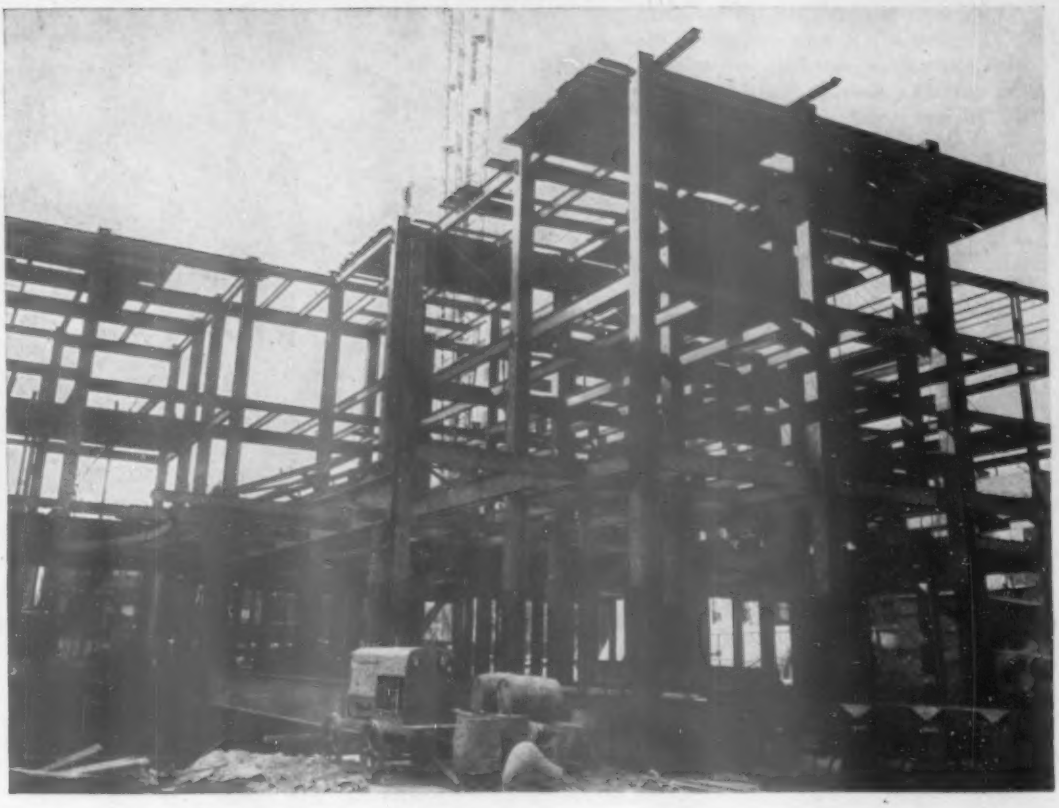
Metal & Thermit Corporation
120 Broadway, New York 5, N. Y.

Gentlemen: Please send me a free copy of your new comprehensive booklet, "Murex Arc Welding Electrodes".

Name .....
Position .....
Company .....
Address .....
City ..... State .....
Your electrode supplier .....
.....

Buildings

Structural steel frameworks grow silently where building contractors have converted to welding



Courtesy Hobart Brothers Co.

Conversion To Welded Construction

The superiority of rolled mild steel to cast iron means many advantages for welded construction. But a welded product must be designed for welding.

BY OMER BLODGETT
Welding Engineer, The Lincoln Electric Co., Grand Rapids, Mich.

★ DESIGN

MORE and more products are being fabricated by welding, and more and more welding is being used. In 1932, 4.8 pounds of welding electrodes were made for every ton of finished steel produced in plates and shapes. By 1943, the ratio had increased to 46.7 pounds of electrodes per ton of finished steel, an increase of almost ten times!

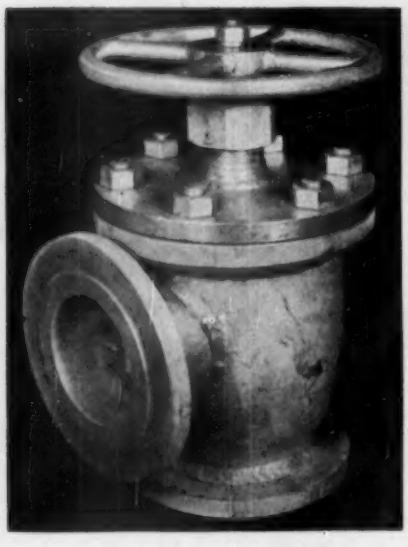
Large Diesel engines have been welded. Modern steel buildings were welded before the war. Homes were welded of steel as an experiment. Some bridges have been welded. Gasoline and oil tanks and pipe lines are practically all-welded, and all ships are now being welded. The aircraft industry is welding molybdenum-steel tubing for its frameworks and will use welding almost entirely as soon as it adapts welding to aluminum alloys. Great advancements have been made in the welding of alloy steels, including steels for high-pressure and high-temperature service.

Our industry is on the threshold of a new era. War brought about widespread recognition of the usefulness of welding. The machinery has been set up to turn out vast quantities of electrodes and welders. Metalworking industries are redesigning and getting more equipment in order to use welding entirely. Government schools have trained thousands of new welding operators. Large companies have set up research laboratories for the further development of welding. Universities are devoting more and more time to the study of welding problems. We have all we need for full-scale postwar development that may eventually eclipse the boom construction of the war years.

Let us analyze the advantages of

Oil **Only through welded construction is it possible to attain the high pressures needed by modern refineries. Conversion to welding made high-octane gasoline a reality**

Valves **Mare Island navy yard found valves of welded construction had many points of superiority over traditional cast valves**



Official U. S. Navy Photograph

Courtesy Black, Sivalls and Bryson Co.

welded construction over castings and see why this rapid conversion to welding is taking place. First, however, we must define the terms to be used in the analysis.

Necessary Definitions

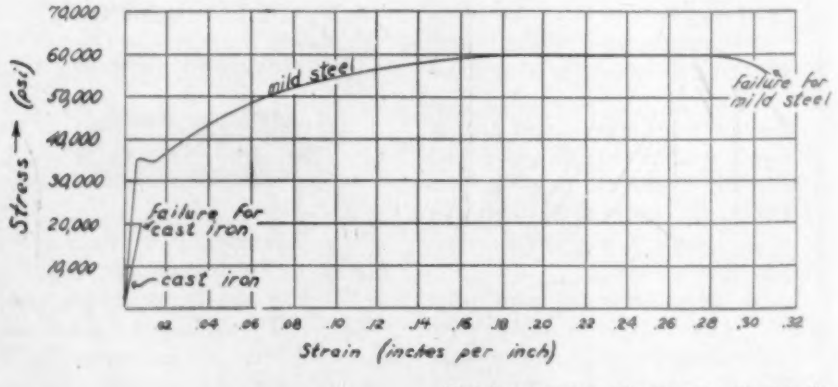
The value of a load has no meaning unless we know the cross-sectional area of the member which carries the load. For this reason, we use the term stress. Stress is the load in pounds divided by the area, and it is measured in the same units as pressure; for example, pounds per square inch.

Metals stretch or yield when subjected to loads. Up to a certain value, the yielding is proportional to the loading (Hooke's law). If the load were removed, the metal would come back to its original size and shape. Above a certain value called the yield point, however, yielding is at a much faster rate, and when the excessive load is removed we find that the metal has stretched slightly. As the loading is further increased above the yield point, the strength of the metal gradually increases due to work hardening or strain hardening. Finally, at a much higher value, we reach the point when failure occurs. The value at failure is called the tensile strength or ultimate strength and, like the yield point, is expressed in pounds per square inch.

In most tensile specimens two center punch marks are made 2 in. apart on the sample. After the specimen has been pulled to failure, it is put back together and the two marks are measured again. The increase in length between the points is the elongation. Supposing the distance between the two points after failure to be 2½ inches, we have an elongation of ½ in. Elongation of ½ in. is then divided by the original 2 inches, giving us an elongation of ¼ in. per inch of material. The elongation per inch of material we call strain, and it is usually expressed in percent. In this case the strain would be 25% elongation, as measured in 2 inches.

A steady load is one placed on the material slowly. An impact load is applied fast—so fast that it can be considered as a load of impact. A

Fig. 1—Flake graphite (long black objects) greatly reduces tensile strength of cast iron. This photomicrograph was taken at 500 X



Sketches courtesy The Lincoln Electric Co.

Fig. 2—Stress-strain diagrams for cast iron and mild steel. Note that cast iron actually yields more (greater strain per stress) up to point of failure

Courtesy Reynolds Metals Co.

Transportation

Lightweight aluminum drums fabricated by welding solve the problem of transporting and storing chemicals. These drums are also suitable for paints, enamels, lacquers and varnishes

reversal of stress is the type of loading that one would get in a fatigue failure, such as bending or flexure which would cause the member to be subjected to tension in one instant and compression the next.

Strength of Cast Iron

Cast iron is made by melting cast-iron scrap, along with some steel scrap and in some cases pig iron, in a furnace called a cupola. Its chemical composition includes approximately 2-4% carbon. An excessive amount of carbon results in a large quantity of free or uncombined carbon in the form of flake graphite. In Fig. 1, a photomicrograph of cast iron taken at 500 X, the long black objects are the cross-sections of flake graphite. The flakes cover a large area and reduce the effective cross-sectional area of the casting so that the tensile strength is greatly lowered. In addition, the graphite flakes cause a certain notch effect which lowers the strength of the cast iron still further when it is subjected to a load. As a result, the ultimate tensile strength of cast iron is usually given as about 20,000 psi; in many cases its strength is much below this value. Mild steel, on the other hand, has an ultimate tensile strength of about 60,000 psi, and alloy steels may have strengths of 100,000 to about 200,000 psi.

In contrast to the making of cast iron, which is nothing more than a melting operation, the producing of mild steel is a series of carefully controlled operations: first in the blast furnace, then in the open-hearth furnace and finally through a long series of rollings. All of this helps to give a much superior metal.

Mild steel, which has a tensile strength of about 60,000 psi, can have an allowable load of 20,000 psi. The allowable load is the actual load for which the member can be designed, taking into account a certain factor of safety. Cast iron, which has a strength of about 20,000 psi, has an allowable load of 5,000 psi. In other words, steel is four times stronger than cast iron in tension.

What we have just said applies to static loads or loads which are applied slowly. If the loads are applied fast as in impact, the allowable loads drop to 3,000 psi for cast iron and to 15,000 psi for mild steel; the mild steel is five times stronger than cast iron in tension under impact.

Variable Tensile Strength

There is another ramification of tensile strength which is seldom considered. The tensile strength of cast iron is usually determined on ½-in. or ¾-in. samples which are cast for this specific purpose. Now the slower cast iron is cooled, the greater will be the amount of graphite found in it. The more graphite present, the lower the strength will be because, as mentioned before, the flakes of graphite reduce the effective cross-sectional area of the iron. Obviously, the rate of cooling of a casting depends upon its thickness or size, the heavier sections cooling slowest. Hence the

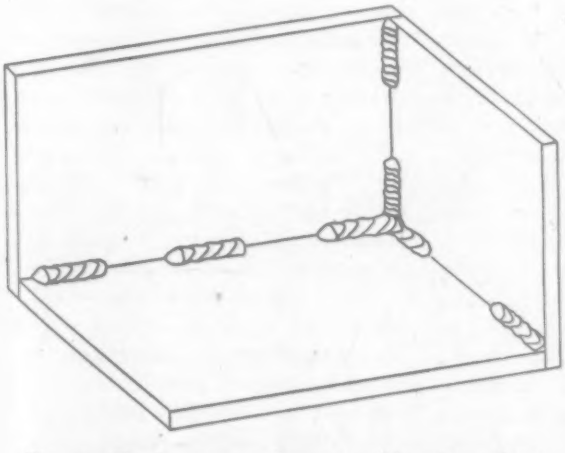


Fig. 4—Don't use continuous welds when short intermittent welds will serve the same purpose

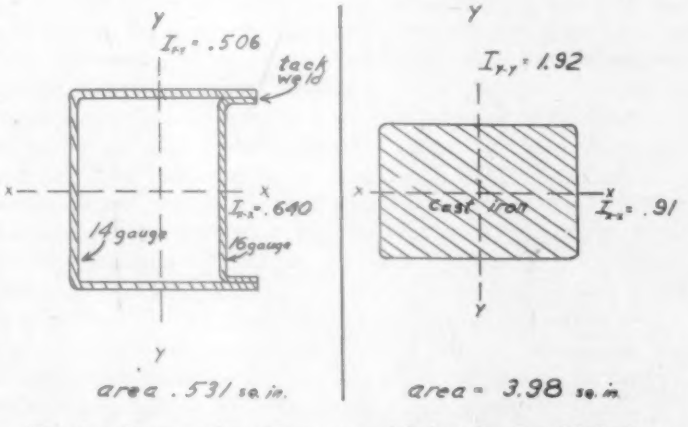
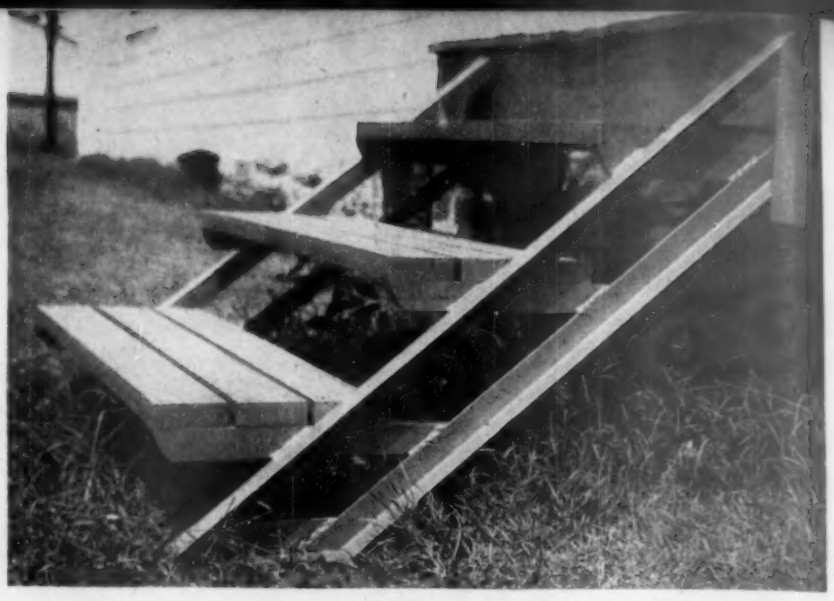


Fig. 3—Cross-section of an arm fabricated of welded sheet metal and one made of cast iron. Both of these members were designed for the same bending moment, but the casting weighs 7½ times as much per foot as the welded member



Courtesy Hobart Brothers Co.

Steps **Even carpenters are converting to welding. Scrap angles provide better stringers than wood for these simply made steps**

smaller cast samples will have greater tensile strength than heavier sections of the castings. It has been found, for example, that an increase in sample diameter from ¾ to 2 in. decreased the strength from about 20,000 to 10,600 psi. This is the ultimate or maximum tensile strength and not the allowable load, which, on this basis, would be about 2,600 psi for the 2-in. sample.

Mild steel does not vary in strength. Regardless of its size or shape, the value of 60,000 psi remains constant.

What can we say about elongation or ductility? Cast iron has almost no elongation while mild steel has from 20 to 35% as measured in 2 inches. This elongation is the amount of strength in the metal when tested to failure and is important because we want a metal which can stretch before failure. In this manner, any locked-up stress or perhaps an impact load may be relieved by the metal yielding a little.

It might be well to compare the stress-strain diagrams of mild steel and cast iron. A stress-strain diagram shows the relationship between the stress or load applied and the strain or deformation produced by the loading. The stress is usually given in pounds per square inch, while the strain is expressed in inches of elongation per inch or percentage of elongation.

In Fig. 2, the vertical axis represents the stress applied, the horizontal axis the resulting strain. In the case of mild steel, we obtain a uniform elongation until yield point is reached at about 35,000 psi; above this load the metal starts to yield at a greater rate and, because of this yielding, work hardens so that its strength increases. After much yielding has taken place, the maximum or ultimate tensile strength is reduced, at which time failure occurs.

Now notice the much shorter curve for cast iron. As the load is increased, the metal yields at a faster rate than mild steel; this is because the modulus of elasticity—the ratio between the stress and the strain—is one half that of mild steel. Also, there is no actual yield point in cast iron; the load can be increased until failure occurs at about 20,000 psi without any appreciable elongation taking place due to yielding.

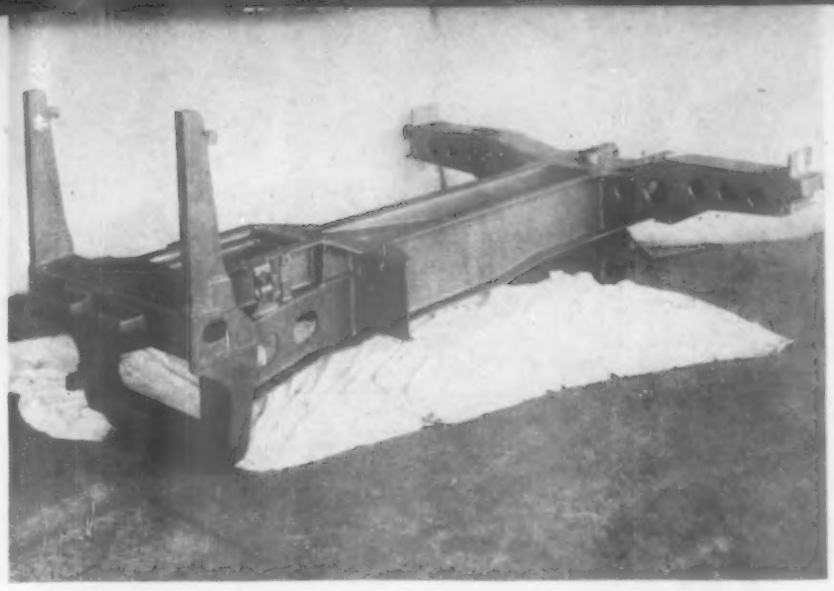
Is Cast Iron Rigid?

Perhaps you have heard such remarks as: "We must have cast iron in this lathe bed or some other machinery foundation because we need a lot of rigidity," or, "This is a precision machine and it must not get out of line." The speakers actually believe that cast iron is more rigid than mild steel. They erroneously think this because they have seen mild steel bend when overloaded while cast iron breaks or snaps. Actually, mild steel is far more rigid than cast iron; in fact, from 2 to 2½ times more rigid. The measure of rigidity is the modulus of elasticity, which is 30,000,000 psi for mild steel, from 12,000,000 to 15,000,000 psi for cast iron.

These values can be taken from any materials handbook. The modulus of elasticity for any material is a constant which is obtained by dividing the load applied per unit area by the strain or unit stretch resulting from this load. This must be done below the elastic limit of the metal or before the metal actually yields. A higher modulus of elasticity merely means that a higher load must be applied to the metal to produce a given deformation. In other words, mild steel may be loaded from 2 to 2½ times greater than cast iron in order to obtain the same amount of deformation. This can be shown by actually taking two bars of the same size and length, one of mild steel and the other of cast iron. On the end of each sample is placed a given weight, and it can be determined by this experiment that the cast-iron bar will deflect from 2 to 2½ times more than the mild-steel rod. What greater proof of rigidity is necessary?

Since mild steel is twice as rigid as cast iron, a welded steel fabrication needs to weigh only about half that of a casting to obtain the same amount of stiffness or rigidity. If stiffness is not a factor, the welded construction may weigh a fourth of the casting since mild steel is from four to five times stronger than cast iron. An example is provided by Fig. 3, which shows the cross-section of an arm fabricated by bending 16- and 14-gauge sheet metal into channel sections and then tack welding the channels into a box section. This was designed to take bending stresses in two directions. The corresponding cast-iron section to take the same bending load is shown alongside. An allowable load of 20,000 psi was used in the steel construction while 5,000 psi was used for the cast-iron member. The cross-sectional area of the steel member is 0.531 sq in. and would weigh 1.8 lb per ft, while the cross-sectional area of the casting is 3.98 sq in. and would weigh 13.5 lb per ft. The cast-iron member weighs 7.5 times as much as the light-gauge steel member! This is merely one example of the advantages that can be obtained with welded steel construction.

Once in a while, someone will try to justify the extra weight of a casting by saying that it reduces vibration. If this is the case, then why



Courtesy The Champion Rivet Co.

Railroads **More and more weldments are being used in the building of freight and passenger cars. This all-welded end underframe was fabricated by the Youngstown Steel Car Corp., Niles, O.**

not fill the machine with sand bags? Actually vibration is reduced by proper stiffening, and this adds very little extra weight.

Wood and Iron

It might be interesting to compare cast iron with wood. Cast iron has about twice the strength of good wood, which does not speak too well for cast iron. According to *Kent's Mechanical Engineers' Handbook-Design Shop Practice,* the tensile strength of single-ply plywood ranges from 7,200 psi for redwood up to 19,800 psi for yellow birch—almost the same strength as cast iron. Johnson shows tensile strengths as high as 29,000 psi for elm; 32,000 for hickory; 19,000 for larch; and 17,300 for longleaf pine; these, of course, were all pulled parallel to the grain and are for small specimens. Nevertheless, such timber as Norway pine in large structural sizes will have a tensile strength of 4,000 psi when subjected to bending.

In most design work a certain factor of safety is used. The ultimate strength of the material is divided by this factor, and the resulting strength is used for the working stress or allowable load. For cast iron we have a factor of safety of 6 for a steady load, 10 for a variable load and 20 for impact. Now for a good grade of wood the factor of safety is 8 for a steady load, 10 for a variable load and 20 for impact.

You will notice that the factors are almost the same for cast iron and wood. What does this mean? The safety factor has no reference to strength, but it does have reference to the uncertainty of determining the loading of the member and likewise the uncertainty of the strength of the material. In other words, we are just as uncertain about the strength of cast iron as we are of wood. As a comparison, the usual factor of safety for mild steel is 4 for a steady load, 6 for a variable load and 10 for impact.

Savings in Machining

Almost all castings must be machined, which represents a large additional cost. Because of the roughness of the surface of the casting, it must be machined for all joining surfaces. All machinery foundations must be machined in order to receive their parts.

The only method of joining two or more castings is to machine the surfaces, drill and tap holes and bolt the pieces together. This is not only costly but is a poor method of joining. Welded joints are made without machining, and in many cases the surfaces of hot rolled or cold rolled steel are smooth enough not to require machining.

In the same way, the costs of finishing and painting a casting are much higher than for a mild-steel weldment. Special antispatter film can be painted on the weldment a few inches on each side of the joint in order to prevent weld spatter from sticking to the steel. Paint can then be applied without any cleaning operation.

It is necessary to put a casting in a rattler of some sort to knock the sand from it. It may then be sandblasted or shotblasted. Any blowholes or sand holes must be chipped out and repaired by welding. Then the weld metal is ground smooth before the casting is painted.

Another definite advantage in the use of welded construction is found in the making of machine tools such as shapers and other metal-working machines. The original cost is not only lower and represents an initial saving, but, because of the higher strengths of welded steel, greater loads can be put on the structure. This means higher cutting speeds and savings that are realized every day the machine is in operation. The daily saving is far more important than the initial saving in the cost of the machine.

Bearing Surfaces

Some men try to justify cast-iron construction by saying that it offers good bearing surfaces. This is a carry-over from earlier days when cast iron was commonly used as bearing surfaces along with babbitt and bronzes. It is true that cast iron along with these other metals makes a good bearing, but that should not be overemphasized because a great number of superior bearing surfaces have been developed. The following table from *Marks' Handbook** shows the allowable bearing pressures of various bearings:

Hardened alloy steel on hardened steel	2,100 psi
Hardened alloy steel on bronze	1,300 "
Alloy steel on bronze	850 "
Mild steel, smooth finish on bronze	550 "
Mild steel, ordinary finish on bronze	400 "
Cast iron on bronze	400 "
Mild steel on cast iron	350 "
Mild steel on lignum-vitae with water lubrication	350 "

It is seen from the above that cast iron on bronze is no better than mild steel with ordinary finish on bronze, and a smoothly finished mild steel is better than cast iron on bronze. Mild steel may be used with babbit metals and bronze as bearings and will carry considerable loads if properly lubricated.

**Mechanical Engineers' Handbook* by Lionel S. Marks, McGraw-Hill Book Co., Inc., 1941.

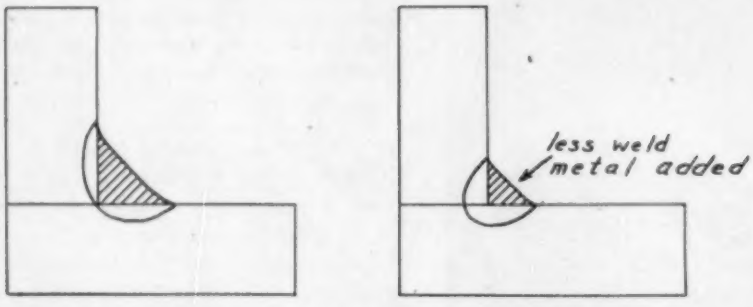


Fig. 5—The E-6013 type of electrode allows higher current and gives greater speed and deeper penetration with less weld metal

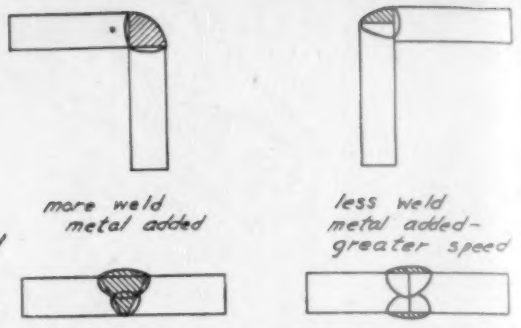


Fig. 6—Two ways to save weld metal. Plate edges in the corner joint are overlapped so that more of the base metal melts. More base metal also melts in the unbeveled butt weld

Welded construction saves pattern costs. This is a substantial saving in structures where a small number is desired or for special designs which must have slight changes for different models. In certain cases, it is possible to overlay a surface with a hard-facing electrode, the overlay becoming an integral part of the structure. In other cases, high-strength steels can be welded directly into the structure for areas of higher stress. Variations of this nature are not possible with castings.

From what has been covered, there should be no doubt that welded construction is far superior to cast iron with regard to quality, strength and service. Is welded construction as low or lower in cost than castings?

Some manufacturers who are still using cast iron will agree that welded construction may be better, but they say it is too expensive. They will then go on to tell how they investigated by duplicating one of their castings with a welded structure. Just as they expected, it cost many times more to weld. If you mention other similar products which happen to be of welded construction, they will say it is because welding has been overadvertised, that there is no economic advantage for the change.

Now any comparison of welded construction and castings must be fair to both. If castings are already being used, it is usually true that the important castings have been changed several times while in service so that they represent the most economical design as far as weight and cost are concerned. Against this veteran, we are expected to pit our new design for welded construction and come out the winner.

In most cases welding *is* the winner! In some cases, however, the contest is a draw, and occasionally welding is the loser. However, any design that gives due consideration to the higher strengths of welded steel and thereby reduces the amount of material used will definitely cost less to produce by welding than by casting. The truth is that about 90% of metal structures can be fabricated by welding at less cost than casting, and the greater portion of the remaining 10% can be welded if a little time is spent on design and some thought is given to welding procedures.

Tips for Welded Design

In converting to welded construction, it is not sufficient simply to duplicate a casting. This practice might result in a higher cost for welding because of the excessive material and weight utilized. Always remember that all cast-iron castings are much heavier than a corresponding weldment need be because of the much greater strength of welded steel. Also, there is a limitation as to how thin a casting may be made. Usually, the thinnest wall is about 5/16 in. In many cases ⅛-in. or 10-gauge sheet metal can be substituted for the 5/16-in.-walled casting.

Don't overweld. It is not necessary to make continuous welds, if short intermittent welds will serve as well (Fig. 4). This will greatly lower the cost. Another design trick is to bend the metal whenever possible and thus eliminate a corner weld.

Certain electrodes developed during the war were designed for faster welding. These electrodes are the E-6013 type, which can be used with higher welding heats without excessive spatter. The welds are smoother, and slag removal is easier; in fact, most of the slag will curl up and fall off by itself. This electrode gives much deeper penetration, requiring less metal for a given size of weld (Fig. 5). Higher welding speeds are also obtained, and less distortion is encountered because the increased speed permits less heat to enter the base metal.

Always use the joint design which requires the least amount of weld metal. Less weld metal means less deposition time, less heat, less distortion and less cost. Fig. 6 shows how the reduction of weld metal in a corner joint was achieved by letting the edges of the plate lap slightly. Also shown is a butt joint in which there was no joint preparation. The weld is made all the way through the plate, but the only weld metal needed is for outer reinforcement. It is easy to see that this joint uses much less weld metal than the one with beveled plates and a vee to fill.

Smaller Welds Save Metal

Smaller continuous welds may often be substituted for larger intermittent welds. Fig. 7 compares a ½-in. fillet weld 3 in. long with a ¼-in weld 6 in. long. The ½-in. weld has four times the cross-sectional area of the ¼-in. weld so that the net effect of using the smaller but twice-as-long weld is to save one half of the amount of weld metal. Both welds have the same strength.

Since higher welding currents may be used for flat-position welding, it is obvious that as much welding as possible should be positioned. By this means larger electrodes and higher currents may be used, with

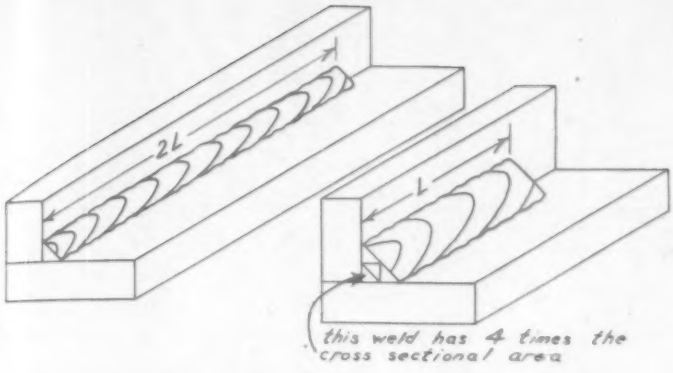


Fig. 7—Both welds have the same strength, yet the one on the left requires only half as much weld metal and can be made at twice the speed of the shorter weld on the right

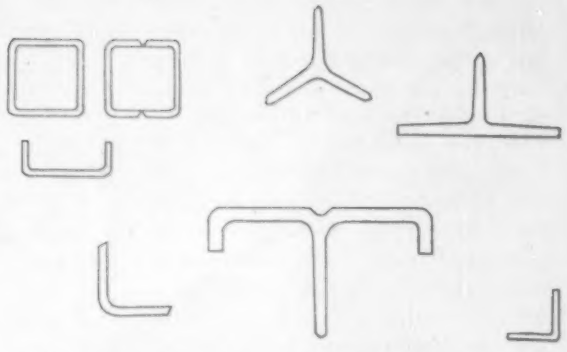


Fig. 8—I-beams, channels, angles, T-sections and other sections made with rounded corners are now available from steel suppliers and enable a smooth flow of stress to be provided in a welded structure

the advantages shown in Table I. With less time for welding, there will be less distortion.

New Structural Shapes

Steel suppliers now offer a great variety of sections and shapes which will greatly aid fabricators of welded steel construction. Such sections as I-beams, channels, angles, T-sections, etc., made with round radius are shown in Fig. 8. When welded into a structure, a section of this type offers maximum fatigue strength because of the smooth flow of stress throughout the section.

Many times, finished welds are ground smooth when it is not actually necessary. Those familiar with cast construction may feel that welds must be ground smooth in order to duplicate the original cast construction. This is a wrong attitude. Unnecessary grinding time usually is greater than the actual welding time and represents a needless increase in cost of fabrication.

The fitter who is cutting the plates is just as responsible for low-cost welded construction as the weldor. Poor fit-up means more weld metal must be used as well as lower welding currents and smaller electrode sizes. The relation of fit-up to welding speed is shown in Fig. 9 for materials of various thicknesses.

Shearing in most cases is the fastest method of making straight cuts. For thick plate and irregular cuts, flame-cutting is recommended. When the number of pieces warrants, the use of blanking dies for cutting is advisable as close tolerances can be held without difficulty.

Steel castings or forgings may be welded into structures to allow for more intricate design or perhaps provide a round corner for appearance. In a similar manner, formed tank heads and stampings may be used in a welded structure.

Automatic Welding Advantages

The advantage of subassemblies on large structures cannot be overemphasized. Before they are welded into the complete structure, the smaller subassemblies may be stress relieved, finish machined, inspected and repaired. Any compartments within them may be tested, thus eliminating more troublesome testing in the final structure. Obviously, there is better access for welding with subassemblies than on the larger completed structure.

Much of the welding mentioned is being done with automatic heads. The advantages are many: much faster welding, almost no distortion and welds so smooth that no grinding is necessary, even for the most exacting fabricator. Because of the much higher welding currents used, greater penetration can be obtained. How this advantage has been applied may be seen in Fig. 10. A joint previously made manually with a large inside fillet weld is now being made with an outside butt weld using the automatic process. Welding speed is 40 in. per minute, and there is no distortion.

Watch Neutral Axis

Something must be said about the position of welds in regard to the neutral axis of a structure. For our consideration, the neutral axis represents an imaginary line or axis about which shrinkage forces due to

Table I. Comparative Data on Electrodes of Different Sizes

Electrode sizes, inches	1/8	5/32	3/16	1/4	5/16	3/8
Amperes (arc)	110	130	150	250	325	425
Arc volts	24	25	26	30	34	38
Kw at arc	2.64	3.25	3.9	7.5	11.1	16.1
Consumption rate, lb per hr	2.6	3.3	3.95	7.5	10.7	16.2
Deposit, lb per hr (50% operating factor)	0.87	1.1	1.32	2.5	3.57	5.4
Efficiency of set (%) at arc voltage	47	50	51	55	59	59
Kw input at arc voltage	5.6	6.5	7.65	13.65	18.8	27.3
Interruptions per lb consumed	18	12	8	5	3	2

Cost per Pound of Metal Deposited

Electrode sizes, inches	1/8	5/32	3/16	1/4	5/16	3/8
Labor	$1.150	$0.909	$0.758	$0.400	$0.280	$0.185
Overhead	1.150	0.909	0.758	0.400	0.280	0.185
Power	0.064	0.059	0.058	0.055	0.053	0.051
Electrodes	0.150	0.135	0.127	0.127	0.127	0.127
Cost of interruption (including overhead)	0.050	0.033	0.022	0.014	0.008	0.005
Total	$2.564	$2.045	$1.732	$0.996	$0.748	$0.553

welding may cause bending or distortion. Consider Fig. 11, which represents two cross-sections of a large plate having angle stiffeners joined to it by intermittent fillet welds.

If you consider the structure as many wide-flange I-beams, the position of the neutral axis may be found by following the rules given in design handbooks. If the neutral axis is found to be in the same line as the fillet welds, it is safe to assume that no bending will take place in that direction due to the welding. If, however, the neutral axis lies above the line of welding, the welding will cause the structure to bend downward. If the neutral axis lies below the line of welding, the bending will be upward.

Consider the engine foundation in the sketches of Fig. 12. The line Y-Y represents the neutral axis of the whole foundation, the line X-X represents the neutral axis of the foundation without the top flange plates. In the left sketch you will notice that the shrinkage effect of all of the welding may be thought to center somewhere in the middle of the cross-section of the structure. Since the effect of the shrinkage of the welding is below the neutral axis, the structure should bow downward; because our shrinkage is pulling below this neutral axis, this is exactly what happens.

Suppose now we weld the foundation without the top flange plates, as shown in the right sketch. Here the shrinkage effect of all of the welding is at the middle and likewise the neutral axis X-X is at the middle. Hence we should get no distortion so far. When the top flange plates are tacked to the foundation, the neutral axis is immediately raised up to line Y-Y; however, the final welding joining the top flange plates to the rest of the foundation also is done in the same region so there is no bending.

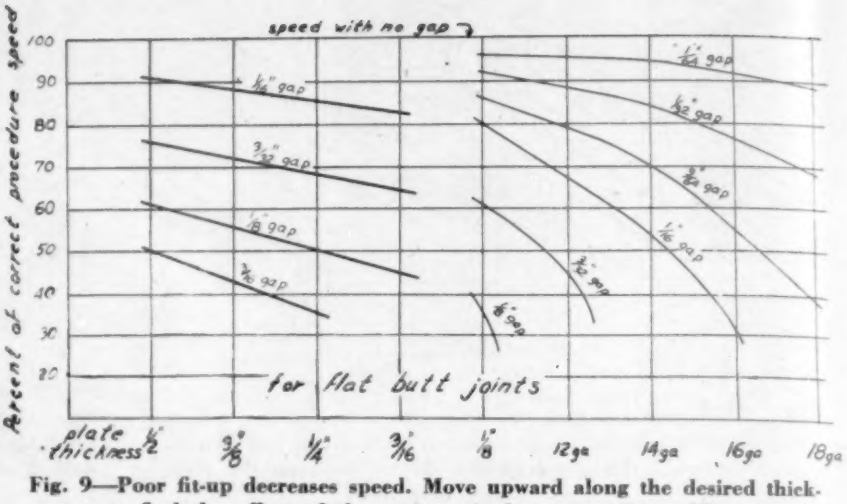


Fig. 9—Poor fit-up decreases speed. Move upward along the desired thickness to find the effect of the various-sized gaps on the welding speed

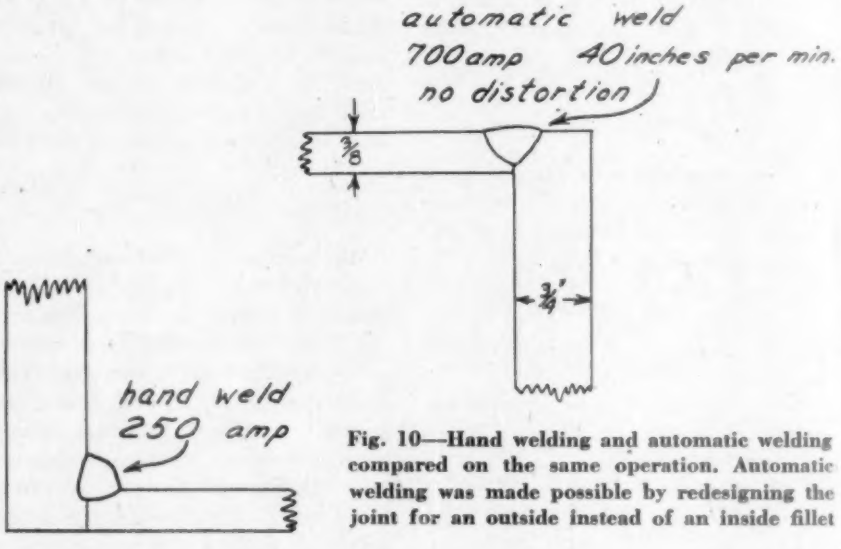


Fig. 10—Hand welding and automatic welding compared on the same operation. Automatic welding was made possible by redesigning the joint for an outside instead of an inside fillet

In the same manner the entire engine foundation may be welded without appreciable distortion lengthwise, just by considering the relation of the neutral axis of the structure with the welds to be made and so planning the erection that the neutral axis is as close to the line of welding as possible.

In redesigning a member or structure for welded steel construction, never try to copy the casting but study the purpose of the particular member and then design the welded member to do its job. To do this, we must first know the nature of the loading and secondly design the member for this load.

If the member is to be subjected to impact, the factor of safety should be greater or the allowable load should be less since a material will

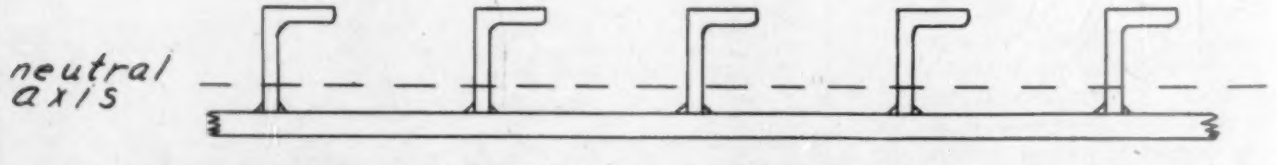
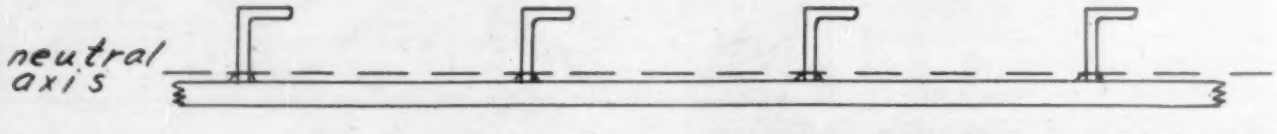


Fig. 11—Large plates with angle stiffeners. Above: shrinkage effect concentrated below neutral axis will cause the structure to bend downward. Below: shrinkage effect along same line as neutral axis minimizes distortion



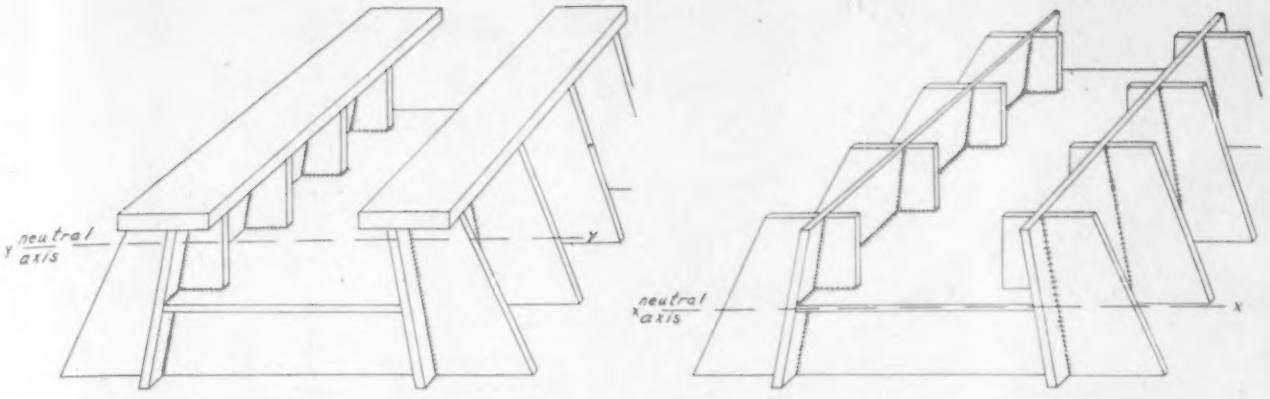


Fig. 12—These sketches for an engine foundation illustrate a welding method that avoids distortion. On the left, the shrinkage effect is concentrated below the neutral axis, causing downward bowing. On the right, the structure is welded without the top flange plates. This lowers the neutral axis X-X to approximately the line of shrinkage and avoids distortion. When the top flange plates are added, the neutral axis is raised to the line of welding (both shown by line Y-Y in left sketch), again avoiding distortion

not yield as easily under impact as it does under a steadily applied load. Also the maximum value of the load is more uncertain and may easily exceed the safe value of the material.

Types of Stresses

There are only three types of simple stresses — tension, compression and shear. A tensile stress tends to pull or stretch a member. A compressive stress tends to push a member together or make it buckle. A shearing stress on a member tends to make one part slide by another. No matter how complicated the nature of loading, it can be reduced to one or more of these three stresses.

When a member is to be designed for pure tension, it is a simple matter to divide the load by the allowable load of the material. This gives the required cross-sectional area.

The same procedure holds for designing a member for a compressive load, providing the member has a low slenderness ratio; *i. e.*, is wide for its length. The slenderness ratio is obtained by dividing the length by the radius of gyration; these values can be found in handbooks. If the ratio is high, there is danger of the member buckling under compression, and additional reduction in the allowable load must be made.

In designing a member for pure shear, it is only necessary to divide the load by the allowable shearing load to get the cross-sectional area. This procedure is just the same as in designing under pure tension except that the shearing strength of the material must be considered instead of its tensile strength.

In designing for bending, it is necessary to realize that bending is a combination of tensile and compressive stresses, tension on one face and compression on the opposite face of the beam. First, it is necessary to know the bending moment of the member. This can in most cases be found from formulae in a steel handbook for different types of loading. Next it is necessary to know the moment of inertia of the member; *i.e.*, the measure of the ability of the member to resist bending. This is also given in tables in steel handbooks.

These two values are then substituted into the following equation:

$$M = \frac{SI}{C}$$

where M = bending moment
S = stress (tensile or compressive)
I = moment of inertia
C = distance to outermost fiber of section

From this equation, the stress in the member can be determined. If it exceeds the allowable load of the material, the member is then designed larger until the stress S is low enough. It is also possible to compute the deflection of the member while under this load.

If the member is to be a shaft and is subjected to torsion, which is a twisting load, it must be designed on the basis of a torsional load and must resist this twisting action by means of internal shearing stresses. You will notice that when we had bending conditions we made use of tensile and compressive stresses; now when we have torsional conditions we make use of shearing stresses. The method of computation is similar except that instead of using the moment of inertia of a member, we use its polar moment of inertia, which likewise may be found in tables. The formula is also similar:

$$T = \frac{SJ}{r}$$

where T = torque
S = stress (shearing)
J = polar moment of inertia
r = distance to outermost fiber

Just as the deflection of a beam may be determined, so may the angular distortion of a shaft under torsion be determined.

Occasionally we get conditions of combined stresses where we may get more than one tensile stress, or a tensile and a compressive stress. These are determined separately and then combined to give the total stress or resultant stress at that point. A good example would be the eccentric loading of a press. There is a tensile stress on the inner face of the press due to the bending moment caused by the loading. In addition, there is a uniform tensile stress across the cross-sectional area due to the pure tension. To get the resultant stress at the inner face, it is necessary to add these two tensile stresses together. On the outer face we have a compressive stress due to the bending moment and a pure tension stress; the resultant stress is the difference between these two.

The pipe stringing crew on the "Biggest Inch" must work miles in advance of the ditching and welding crew

Subsurface water didn't help make this bell-hole weld any easier

Going is faster when long strings of pipe are welded together out of the ditch. Note desert terrain

Laying the "Biggest

The world's largest high-pressure-transmission line calls for an

H. C. PRICE Co., pipe-line contractor of Bartlesville, Okla., is busily engaged in laying the largest high-pressure-transmission pipe line ever built. Known as the Biggest Inch, this 214-mile line extends from the Colorado River at Blythe, Calif., to Santa Fe Springs near Los Angeles. Its pipe is 30 in. in diameter,* and it is only one section of a 1,200-mile line that will bring natural gas from Texas wells to Southern California.

*See "Pipe for the Biggest Inch," THE WELDING ENGINEER, July, 1947, page 33.

The first 150 miles of pipe cross the upper Colorado Desert. Here the mercury rises to 130 F, and the contractor is faced with difficulties that are not usually encountered in pipeline work.

Water presents a double problem. Good drinking water often has to be hauled 50 miles or more. Yet there are spots where water is only 18 in. below the surface and causes considerable caving in of the ditches dug in the sandy soil. The subsurface water, unluckily, is unfit for drinking.

The line is being laid in 60-ft section by the stovepipe method. Routine pipe-laying techniques are generally

A group of six cat-cranes lowers a 60-ft section of "Biggest Inch" line. Whitened appearance of the pipe results from whitewash applied to reduce softening of the tar coating in desert areas, dropping temperature of pipe 50 deg F. Under important streams an inch of "Gunite" coating will protect the pipe from corrosion

Portable grinders, operated from small portable light plants, prepare the edges to insure perfect alignment of butt welds

Huge welding fittings are employed to make such 90-deg bends as this one

The pipe is enclosed in a 36-in. casing when it runs under roads or irrigation ditches

Inch" Pipe Line

★ CONSTRUCTION

enormous amount of welding to join the 30-in.-diameter pipe sections

being utilized. Because of the size and weight of the pipe, the heaviest construction equipment has to be used. The 30-in. pipe requires a ditch 40 in. wide by 5 ft deep. Before this tremendous ditch is completed, it will be necessary to move more than 18½ million cubic feet of dirt, sand and rock.

More heavy earth-moving equipment—bulldozers, angle dozers and draglines—is being used on this job than was ever before engaged in the making of a pipe-line right-of-way. It is necessitated by the rough, hilly terrain encountered both in the mountains and on the desert.

The accompanying pictures show typical scenes in this big construction job. A novel manner of checking the field welds is being employed, based on wartime shipyard welding practices. Engineers are using radium to check the field welds. Each weld is gamma-ray-inspected immediately upon completion, and the radiographs are developed in a portable field laboratory which closely follows the welding crew. Gamma raying in the field makes it possible to check the workmanship from day to day and eliminates all guess work.

Photos courtesy The Lincoln Electric Co. and Southern California Gas Co.

In making a circular cut, the operator seated atop the pipe turns the crank attached to the sprocket. This propels the cutting torch around the periphery of the 30-in. pipe. The workman in the left foreground has only to see that the cutting flame is regulated.

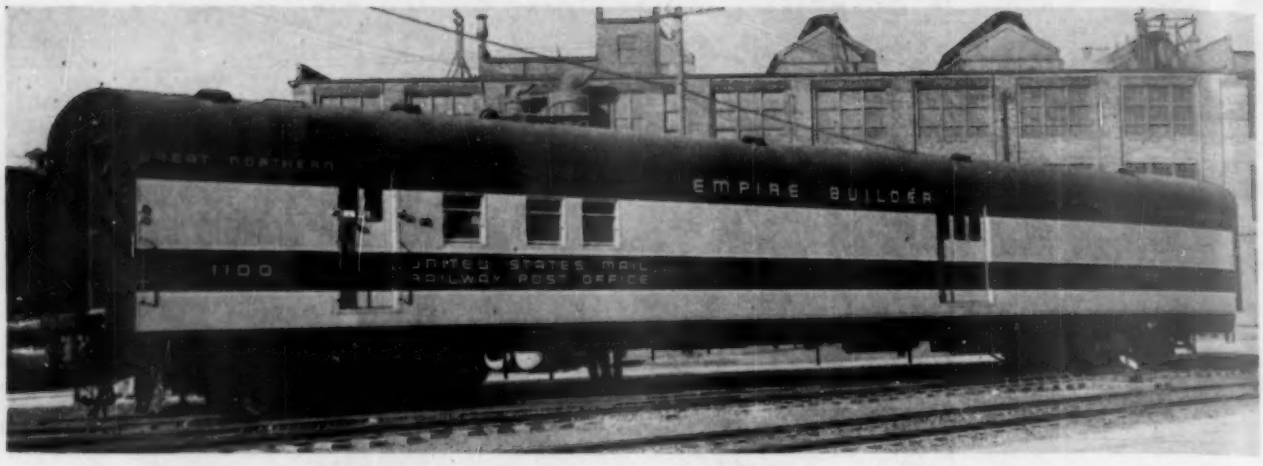


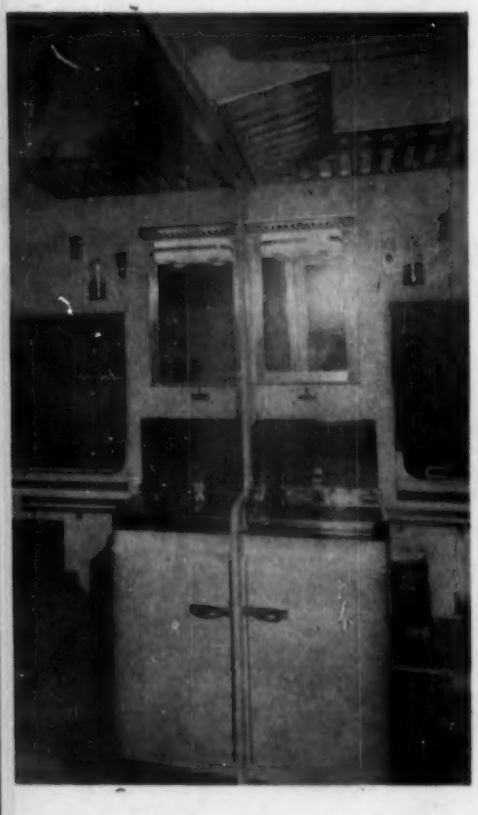
Fig. 1—This railroad car for the Great Northern Railway has smooth sides and a painted exterior

Welding Railroad P

Many novel and ingenious welding techniques have been developed for the underframe and side frames of passenger cars. Submerged-melt welding is extensively employed.

BY ARTHUR M. UNGER
Chief Welding Engineer, Pullman-Standard Car Mfg. Co.

Fig. 3—This bedroom requires arc welding, spot welding, oxy-hydrogen welding and oxy-acetylene brazing. High-tensile and mild steel, stainless and aluminum are all employed



THE modern railroad passenger car provides the occupant of a bedroom on a sleeping car with all the services of a modern hotel. He has automatically controlled temperatures, a supply of fresh air heated in the winter and cooled in the summer, electric lights, hot and cold running water, and private toilet facilities. When meal time comes, he seats himself in a diner and is served with a meal equal to that prepared in the finest of hotel kitchens. And all of these services are available while he is traveling across the country at express-train speeds.

It didn't just happen so. Manufacture of today's railroad car involves a very considerable amount of "know-how" in the use of many different kinds of material and equipment. Nearly all building trades are represented, even interior decorators. Among these various trades is welding, which has proved itself a most versatile tool in the manufacture of the railroad passenger car.

All Types of Welding

The different types of cars and the various parts of each car require the joining together of a variety of metals in all shapes and sizes. This necessitates the use of all types of welding processes and equipment. The welding engineering department of a railroad passenger car builder must be familiar with all types of welding in order to know just which process will best join the variety of materials, parts and equipment that make up the modern railway car. At Pullman-Standard, it is the job of the welding engineer first to recognize the many welding problems that are presented in the manufacture of a car and then to devise various processes and equipment to solve them.

Figs. 1 and 2 show exterior views of two general types of cars. The first (Great Northern) has painted exteriors and smooth sides. The second (New York Central) has a shining stainless-steel exterior. To produce these structures, a number of welding processes are needed.

Beginning with the roof, spot welding and arc welding are used. To make the sides, manual arc welding, submerged-melt welding and spot welding are all necessary. The underframe is built by arc welding, submerged-melt welding and spot welding. Automatic equipment is used

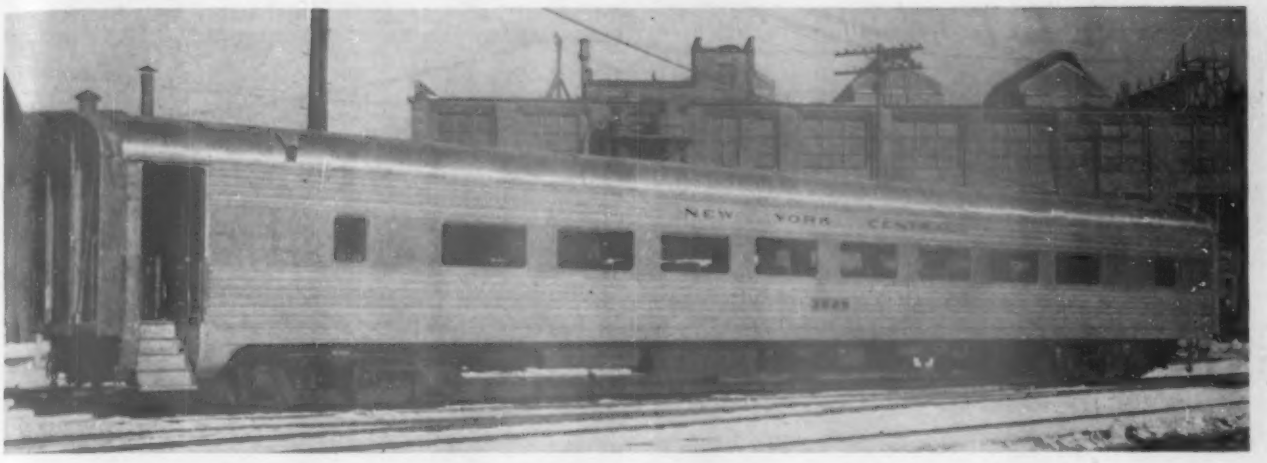


Fig. 2—A stainless-steel car with corrugated sides is favored by the New York Central System

Passenger Cars—I

quite extensively for both submerged-melt and spot welding. Some fixtures we use here are so huge that they can handle the entire side or entire roof of a full-size railroad passenger car. Pullman-Standard has the largest and most complete outlay of resistance-welding equipment in the world.

Many Different Materials

The materials used in the structural members of the welded car are high-strength steel and stainless steel. In many cases these different materials are welded to each other. Interesting research problems have had to be solved to join satisfactorily these dissimilar metals* They have been successfully joined in a variety of gauges, by the arc, submerged-melt and spot-welding processes.

*"Electromagnetic Stirring Action in a Spot Weld"—Jan. 1941, *Welding Journal.*

Fig. 4—One of the chief subassemblies of a railroad passenger car is the underframe, produced largely by automatic submerged-melt welding

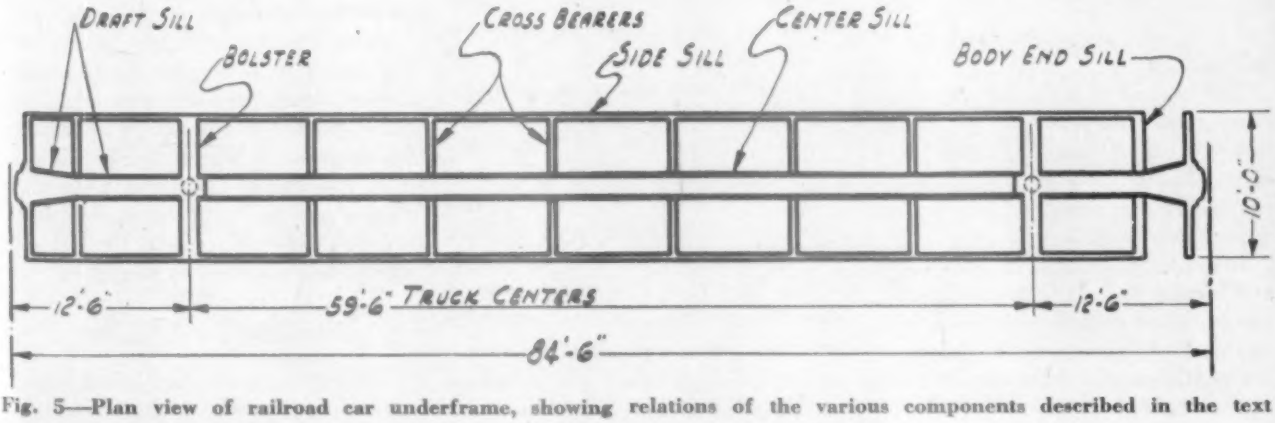


Fig. 5—Plan view of railroad car underframe, showing relations of the various components described in the text

Fig. 6—Submerged-melt welding of the center sill member. With the aid of a specially built jig and clamping equipment, one man can handle the entire 60-ft seam

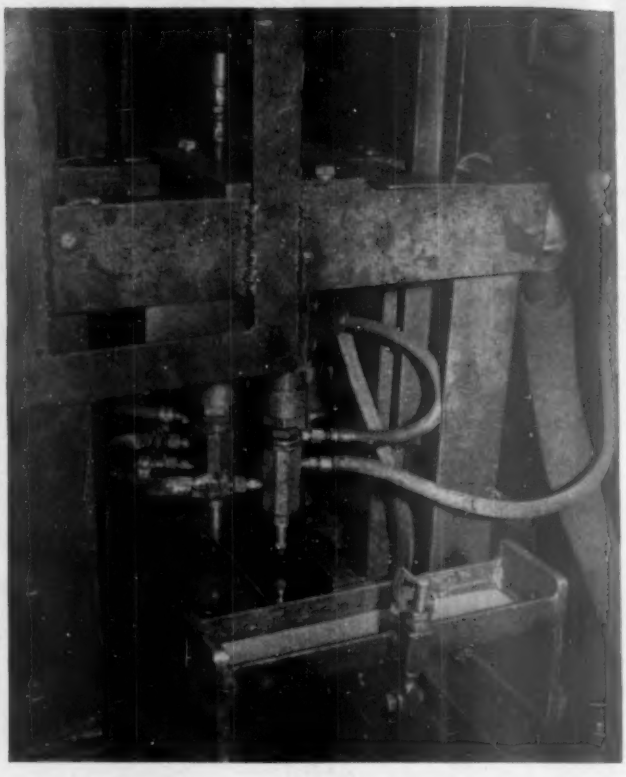


Fig. 7—Close-up of equipment used for spot welding support angles to the main side sill member. Simultaneous welds are made on each angle by the two electrodes

On our side sheets we weld 14-gauge stainless steel or 14-gauge low-alloy, high-tensile steel by the submerged-melt process. On both of these metals, we use a ⅛-in.-diam electrode and a 25-volt arc at a travel speed of 60 in. per minute. We use a current of 260 amp for the stainless steel, which is welded with a stainless electrode, and 280 amp for the low-alloy, high-tensile steel, which is welded with a mild-steel electrode.

The interior of one type of bedroom designed by Pullman-Standard is shown in Fig. 3. Manufacture of this bedroom requires the use of arc welding, oxy-hydrogen welding, spot welding and oxy-acetylene brazing. High-strength steel, mild steel, stainless steel and aluminum must all be welded.

The kitchen of a dining car is another good example of the use of different types of materials and processes. In addition to the materials previously mentioned, Monel is used quite extensively.

In building a car, Pullman-Standard breaks it down into major subassemblies of underframe, sides, ends and roof. Various welding processes are used throughout the construction of each subassembly.

Welded Underframe

The underframe of the railroad passenger car (Fig. 4) consists of the center sill, side sills, cross bearers, floor beams, draft sills and body end sills. Considerable manual arc welding and automatic submerged-melt welding are used to join the various members of this subassembly, which is depicted on the plan view, Fig. 5. For our submerged-melt welding we use a current range of 260 to 930 amp. Wire sizes are: ⅛, 5/32, 3/16 and ¼ in.

As the plan view shows, the center sill is the longitudinal member in the center of the car. This member is designed to carry the buffing load of the car from one end to the other. It is required to carry a load of 800,000 lb in compression. The center sill is made by welding together two Z-sections. The top flanges are joined together so that the unit forms a flanged U-section. The weld joins the ⅜-in.-thick flanges in a butt joint 60 feet long.

The length of this weld makes it very advantageous to use automatic submerged-melt equipment, as shown in Fig. 6. The center sill is welded at a speed of 30 in. per minute, using 900 amp, 33 volts and a ¼-in. mild-steel electrode wire.

The parts are hydraulically clamped together in a fixture designed by the planning department of Pullman-Standard. The fixture has a longitudinal camber of 4½ in. to compensate for the shrinkage of the 60-ft weld. When removed from the jig, the sills are perfectly straight.

The clamps are mounted at 3-ft intervals, and each has its own hydraulic cylinder. Pressure is exerted in both a horizontal and a downward direction. All of the hydraulic cylinders are manifolded together and fed from one hydraulic pump, permitting the clamping operation to be accomplished by turning a single valve.

With this type of fixture, the welding operator is able to do his own fitting. Furthermore, it now requires only about 1½ minutes to do a job which formerly required 30 minutes. The Z-sections are lifted onto the fixture and the center sills are lifted out by an overhead crane. Everything else is accomplished by one man.

Side Sills and Bolsters

Side sills are the two longitudinal side members running the full length

of the underframe. A side sill consists of an unequal-legged angle, 10½ by 3 in., ⅛ or 3/16 in. thick, to which are spot welded two floor-support angles, 1 by 1 by ⅛ in. Fig. 7 shows a close-up of the special spot-welding equipment developed to weld on these angles. The operator fits the ends of the small angles into locating gauges and presses the start button. Two electrodes connected in series then make simultaneous welds on each angle. When the electrodes lift up, an indexing device moves the sill forward the correct distance. The next weld is made automatically, and the operation keeps repeating until stopped by the operator when the machine reaches the other end of its 80-ft length.

Cross bearer and floor beams are the transverse members that support the floor load and transmit it into the side sill. These members are pressed channels and rolled Z-sections and are manually arc welded to the center sill and side sills.

Located near each end of the underframe are two large transverse members called bolsters. These are fabricated by welding two vertical webs, spaced apart, to top and bottom cover plates in order to form a box section. The welding is done with an automatic submerged-melt head mounted in a portable gantry frame (Fig. 8) designed by the Pullman-Standard jig and fixture department. The overhead supporting track permits the welding head to be moved over different types of welding fixtures. The supporting track for the welding carriage is straight, but the curved bottom cover plate of the bolster makes it necessary to have the nozzle of the automatic head follow a curved line. The nozzle feeding the welding electrode follows the curved plate as the head is pivoted, while spring tension keeps the electrode guides constantly in contact with the bolster cover plate and web. Since the head is pivoted in both vertical and horizontal directions, great flexibility of movement is permitted.

Draft Sills Automatic-Welded

The portable gantry type of supporting fixture is a very useful tool for the automatic welding of many other subassemblies. An example is the draft sill, that weldment attached to the end of the center sill. There are two of them, one at each end.

Fig. 9 shows a sketch of the draft sill assembly. The top and bottom cover plates are submerged-melt welded to the web plates in a manner similar to the welding of the bolsters. The parts are assembled and tack welded together in a jig prior to the automatic welding of the cover plates. Jigs and fixtures for all subassembly parts have been carefully engineered at Pullman-Standard to produce weldments of the correct shape and dimensions. Fig. 10 shows the fixture for the draft sill, center end sill and bolster assembly, and Fig. 11 the weldment it produces. In building up this assembly through welding, instead of using the previous solid casting, Pullman-Standard saved a weight of 750 lb per car.

Side Subassemblies

Sides for a passenger car are divided into two main subassemblies, the framing and the side sheet. Both these units are built into complete car-sized assemblies before they are joined together. There is a very definite reason for this. The side has flat panels, and every operation

Fig. 8—Portably gantry frame as used in the submerged-melt welding of bolsters (large transverse members). Carried on an overhead track, the welding head can readily be employed with many different types of fixtures

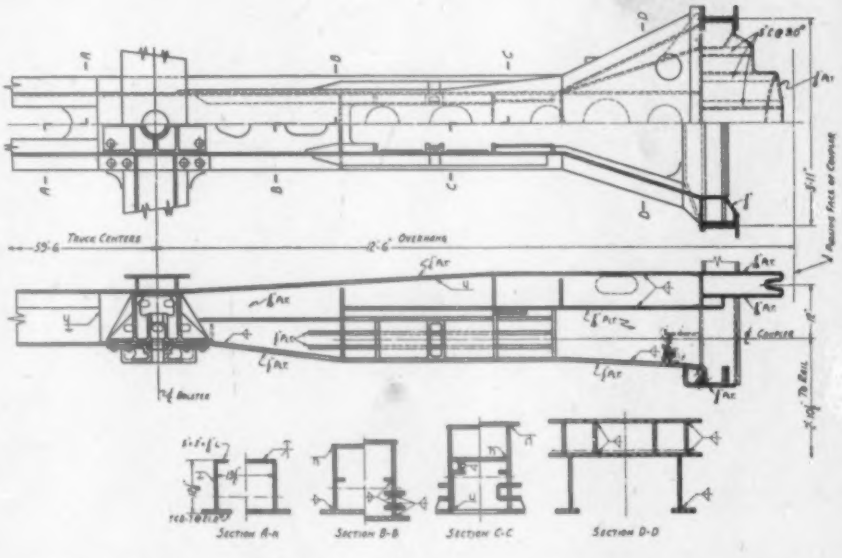


Fig. 9—Sketch of welded draft sill. This weldment goes at either end of the railroad car. The parts are assembled and tack welded together in a jig

Fig. 10—A carefully engineered welding fixture is used for the draft sill, center end sill and bolster assembly

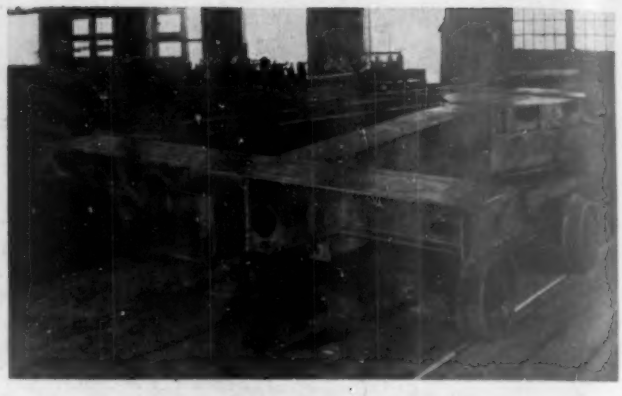


Fig. 11—The welded draft sill, center end sill and bolster assembly. It saves a weight of 750 lb per car

must be done in a manner that will not produce any buckles in the side sheets. The framing is arc welded together. By keeping the two operations separate, the shrinkage from arc welding takes place without affecting the side sheets. The framing is straightened before it is spot welded to the side sheet, thereby producing a flat side with no distortion.

The side framing is made from arc-welded Z-sections. The horizontal members are full length, but the vertical members or posts are split into three pieces. The spacing between the posts varies, and it is more desirable to split the vertical members rather than the horizontal in order to keep to a minimum the number of different lengths that will be required.

Fig. 12 shows side framing members being welded together in the side frame jig. The members are held against locating stops by specially designed clamps. One pull of the lever tightens the Z-section against the stop in two directions. Release of the clamp shifts it to the end of the pivot pin and swings it out of position. This permits access to the final parts of the weld, after the major portion has been completed, while the members are firmly clamped in the correct position.

All clamping parts of this side frame jig are attached to the vertical member. When it is necessary to reset the jig for a different car plan (which means a change in post spacing), the vertical members are moved to the new location. The clamps for the horizontal framing members are attached to this vertical jig part and so are automatically in the correct position when the vertical member is set for the new post spacing.

Railroad car sides are built with a camber, which must be provided by the side frame jig. Hence it is necessary as the vertical members of the jig are moved to different locations to adjust them in height to fit the camber curve. This is accomplished automatically by supporting the top part of the vertical members on a roller. The roller runs along a track that is set for the proper camber, and the jig parts raise or lower with the track as required by the camber curve. When clamped at the desired location, they are automatically at the correct camber.

Each one of the vertical jig stops has a shrinkage stop which slides into a slot when it is rotated 90 deg. This feature permits the post to be held in correct position for tack welding and then allows space for shrinkage of the 80-ft framing for free removal from the jig, avoiding distortion of jig parts from shrinkage stresses.

After the side framing has been removed from the welding jig, it is taken to a straightening position, where all the flanges to which the side sheet will be spot welded are checked for perfect alignment.

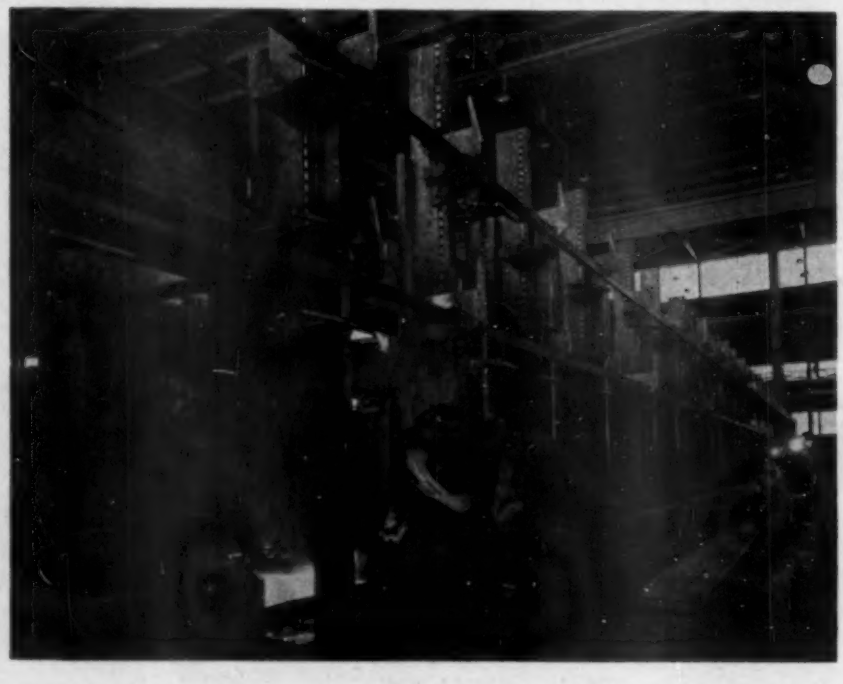


Fig. 12—One of the company's most ingenious jigs is employed for the arc welding of the side framing. The members are held against locating stops. This jig automatically adjusts itself in height to fit the car camber

---

The world's largest multiple spot welder is employed by Pullman-Standard to weld stiffeners to the side sheets. Mr. Unger will discuss this and other resistance-welding equipment developed for welding the side sheets and the roof in the final installment of this article, to be published next month.

AWS Meets in Chicago

For the first time in four years the American Welding Society is returning to Chicago for its annual meeting, to be held Oct. 19 to 24.

New president: Harold O. Hill, assistant chief engineer, fabricated steel construction, Bethlehem Steel Co., is slated as first vice-president of AWS to succeed to the presidency for the 1947-48 term

FORTHCOMING twenty-eighth annual meeting of the American Welding Society is to be held at the Hotel Sherman, Chicago, the week beginning October 19. Like last year's Atlantic City meeting, the Chicago convention is to be a five-day affair, emphasizing postwar production uses of welding through some 64 technical papers. It represents the first time since the war meeting of 1943 that an AWS convention has been held in the Windy City.

Concurrently with the welding society meeting will be held the twenty-ninth National Metal Congress and Exposition. Also during the same week three other technical societies will hold their annual meetings in the Illinois metropolis. The American Society for Metals will convene at the Palmer House, Oct. 20-24. The American Institute of Mining and Metallurgical Engineers (Iron and Steel Division and The Institute of Metals Division) meets at the Stevens, Oct. 20-23. The American Industrial Radium and X-Ray Society will gather at the Sheraton Hotel (formerly the Continental), Oct. 20-24.

For members of the American Welding Society, the week's activities open socially with the reception of President L. W. Delhi on Sunday evening, Oct. 19. This will take place 5 to 7 p. m. in the Louis XVI room on the first floor of the Hotel Sherman. The technical program of 19 sessions (see program on pages 52-53) gets under way at 9:30 a. m. Monday, Oct. 20. One of the three simultaneous technical sessions to be held Monday morning will include general papers on the elimination of distortion, welded fabrication and precision pressure regulation of gases. The other opening sessions will deal with railroad locomotives, cars and maintenance-of-way work and welding as applied to air conditioning and refrigerators.

No papers will be presented on Monday afternoon, giving delegates the opportunity to visit the National Metal Exposition (see page 63). This event will be held at the International Amphitheatre in the Stockyards district of Chicago. There will be welding and cutting exhibits and demonstrations as well as other items. Thursday afternoon is likewise to be held open for visits to the Metal Show.

The simultaneous technical sessions resume at 9:30 a. m. Tuesday and continue morning and afternoon until noon Friday, with the aforementioned exception of Thursday afternoon. These remaining 16 sessions will cover such subjects as the welding of pressure vessels, maintenance welding, resistance welding, flame-cutting, welding of non-ferrous metals, high alloys, low-alloy steels, structural welding. An entire session will be devoted to inert-gas-shielded arc welding (Friday morning), at which two technical papers will be presented. There will also be four research sessions, two of which will be confined to discussion of ship structure research problems.

Fourth annual Adams Lecture will be delivered by G. S. Mikhalapov, manager, apparatus research, Air Reduction Sales Co., on Monday evening in the ballroom of the Sherman. The Lincoln Gold Medal, Samuel Wylie Miller Memorial Medal, RWMA awards and other prizes will be presented at the same Monday evening session.

Remaining nights will not be idle. The University Research Conference will be held on Tuesday evening, the section officers' conference on Wednesday evening and the society's annual banquet on Thursday evening. The last-mentioned event will take place at 6:30 p. m. in the hotel's grand ballroom on the mezzanine.

The week will be traditionally closed with the annual business meeting and installation of new officers. The business session begins at 2 p. m. Friday and will include the election and installation of 1947-48 officers. At 3:00 p. m. the newly elected officers will gather with the society's board of directors to make plans for the coming year.

Altogether, it looks like a big week!

Tentative Program for 28

Monday, October 20

9:30 A.M.—Simultaneous Technical Sessions

GENERAL PAPERS
(Ballroom)

R. E. McFarland, chairman; C. O. Druetzler, vice-chairman.
"Directional Welding to Minimize or Eliminate Distortion in Weldments and Control Residual Stresses," by Joseph Holt, consulting engineer.
"Precision Pressure Regulation of Various Gases," by J. K. Hamilton, Air Reduction.
"Welded Fabrication," by Ray Stitt, R. C. Mahon Co.

RAILROAD WELDING
(Louis XVI Room)

J. W. Sheffer, chairman; T. B. Jefferson, vice-chairman.
"Flame-Hardening Locomotive Brake and Spring Rigging Pins and Bushings," by B. W. Covell, Northern Pacific Railway Co.
"End-Hardening of Rails and Open-Hearth Frogs," by R. W. Torbert, The Oxweld Railroad Service Co.
"New Developments in Railroad Maintenance-of-way Work," by C. A. Daley, Air Reduction.
"Problems in Resistance Welding Stainless Steel Railway Car Structures," by J. Van den Beemt, The Budd Co.

AIR CONDITIONING AND REFRIGERATORS
(Crystal Room)

L. S. McPhee, chairman; E. Vom Steeg, Jr., vice-chairman.
"Welding in Assembly Line Production of Refrigerator Cabinets," by P. Bowman, Seeger Refrigerator Co.
"High-Speed Automatic Oxy-acetylene Welding," by H. O. Jones, Air Reduction.

Monday Evening—Prize Awards, Adams Lecture
(Ballroom)

Tuesday, October 21

9:30 A.M.—Simultaneous Technical Sessions

PRESSURE VESSELS
(Louis XVI Room)

I. B. Harter, chairman; T. C. Fetherston, vice-chairman.
"Welding of Locomotive-Type High-Pressure Boilers," by George M. Trefts, Farrar and Trefts, Inc.
"Carbon Arc Welding of Copper Pressure Vessels," by John J. Vreeland, Chase Brass & Copper Co.
"Integral Cast Bosses for Pressure Vessels," by H. L. Anthony and H. P. Schane, Scaife Co.
"Development of Butt-Welded Joints in Pressure Vessels," by Edwin J. Brown, Union Iron Works.

MISCELLANEOUS
(Crystal Room)

H. O. Hill, chairman; K. W. Ostrom, vice-chairman.
"Multi-Flame Pressure Welding Process," by N. H. Cuke, Canadian Liquid Air Co., Ltd.
"Controlled Low-Temperature Stress-Relieving of Welded Tanks for Wet Seal Gas Holder," by R. Kraus, Stacey Bros. Gas Construction Co.
"Composite Alloy Fabrication with the Hidden Arc," by H. E. Cable, Lincoln Electric Co.
"Semi-Automatic Welding with Standard Manual Arc-Welding Equipment," by F. W. Myers, Jr., Watertown Arsenal.

RESEARCH
(Ballroom)

J. J. Crowe, chairman; G. E. Doan, vice-chairman.
"Determination of Physical Chemical Factors in Stress Corrosion Cracking of Mild Steel," by H. J. McDonald and M. G. Winterstein, Illinois Institute of Technology.

President's reception will be held on Sunday evening

Hotel Sherman, Clark and Randolph streets, Chicago, will be the setting for a big five days of welding sessions

"Some Unusual Features Encountered in the Investigation of Cracked Welds in 3515 Magnesium Retorts," by H. J. Nichols, Department of Mines and Resources, Ottawa, Ontario, Canada.
"Distribution of Strength and Ductility in Welded Steel Plate as Revealed by the Static Notch Bar Tensile Test," by W. F. Brown, Jr., L. J. Ebert and G. Sachs, Case School of Applied Science.

2:00 P.M.—Simultaneous Technical Sessions

PIPE AND MAINTENANCE WELDING
(Louis XVI Room)

D. H. Corey, chairman; R. W. Clark, vice-chairman.
"Metallurgical Properties of High-Strength Seamless Line Pipe," by A. B. Wilder and J. D. Tyson, National Tube Co.
"The Maintenance Weldery, Its Equipment, Supplies, Organization and Methods," by Cleo E. Hook, Noblett Sparks Industries, Inc.
"Building, Repairing and Design of Farm Machinery," by Ernest J. Koop, Ernest J. Koop Welding & Blacksmith Shop.

RESEARCH
(Ballroom)

G. E. Claussen, chairman; A. R. Lytle, vice-chairman.
"Low-Temperature Charpy Tests of Various Ferritic Weld Deposits," by W. B. Bunn, The M. W. Kellogg Co.
"The Effect of Titanium and Vanadium on the Mechanical Properties and Weldability of Experimental Low-Alloy Steel," by George G. Luther, Donald B. Roach, and Carl E. Hartbower, Naval Research Laboratory.
"Effects of Section Size on the Static Notch Bar Tensile Properties of Mild Steel Plate," by L. J. Ebert, W. F. Brown, Jr. and J. D. Lubahn, Case Institute of Technology.

28th Meeting

October 19. Technical sessions start Monday morning

HIGH ALLOYS
(Crystal Room)

H. C. BOARDMAN, chairman; WM. E. CRAWFORD, vice-chairman.
"Welding and Fabrication of High-Temperature Alloys," by C. G. Chisholm, Haynes Stellite Co.
"Some Factors Controlling the Ductility of 25 Cr-20 Ni Weld Deposits," by O. R. Carpenter and N. C. Jessen, Babcock & Wilcox Co.
"Selection of Austenitic Electrodes for Welding Dissimilar Metals," by Anton L. Schaeffler, Arcos Corp.

Wednesday, October 22

9:30 A.M.—Simultaneous Technical Sessions

RESISTANCE WELDING
(Louis XVI Room)

R. E. POWELL, chairman; G. N. SIEGER, vice-chairman.
"Flash Welding of the Structural Aluminum Alloys," by R. Condit Becker and Robert M. Curran, Rensselaer Polytechnic Institute.
"The Metallurgy of Carbon Steel Spot Welding (0.01-1.00 C)," by Julius Heuschkel, Westinghouse Research Laboratories.
"Engineering Symposium of Future Control of Resistance-Welding Machines," by C. E. Smith, Taylor-Winfield Corp.
"A Study of Projection Welding," by W. F. Hess and Wylie J. Childs, Rensselaer Polytechnic Institute.

CUTTING
(Ballroom)

HARRIS A. GOODWIN, chairman; HENRY BOOTH, vice-chairman.
"Powder Cutting as a Production Tool," by D. H. Fleming, Jr., The Linde Air Products Co.
"The Theory of Oxy-arc Cutting, Preheating Effect, Functions of Coating, Functions of Core, Stack Cutting, Non-Ferrous Cutting," by H. C. Campbell, Arcos Corp.
"Flux Cutting Alloy Steels," by G. E. Bellew, Air Reduction.
"Oxy-acetylene Production Cutting in Steel Mills," by A. H. Yoch and W. Begerow, Air Reduction.

SHIP STRUCTURES RESEARCH
(Crystal Room)

C. H. HERTY, chairman; CAPT. L. V. HONSINGER, vice-chairman.
"Causes of Cleavage Fracture in Ship Plate—Tests of Wide-Notched Plates," by A. Boodberg, H. E. Davis, E. R. Parker and G. E. Troxell, University of California.
"Cleavage Fracture of Ship Plates as Influenced by Size Effect," by W. M. Wilson, R. A. Hechtman and W. H. Bruckner, University of Illinois.
"A Study of Internally-Notched Tensile Specimens for Evaluating the Toughness of Structural Steel," by H. R. Thomas and D. F. Windenburg, David Taylor Model Basin, USN.
"Investigation of Steels Removed from Fractured Ships," by G. A. Ellinger and Morgan L. Williams, National Bureau of Standards.

2:00 P.M.—Simultaneous Technical Sessions

RESISTANCE WELDING
(Louis XVI Room)

JOHN D. GORDON, chairman; B. L. WISE, vice-chairman.
"The Heat Treatment Spot Welds of Steel Plate," by W. D'Orville Doty, Wylie J. Childs and W. F. Hess, Rensselaer Polytechnic Institute.
"The Development and Application of Quality Control Techniques to Resistance Welding Production," by O. C. Frederick, General Electric Co.
"Shunt Circuit Impedance in Spot Welding," by Robert Blair, Taylor-Winfield Corp.

NON-FERROUS
(Crystal Room)

G. O. HOGLUND, chairman; C. H. JENNINGS, vice-chairman.
"Arc Welding Copper and Copper-Base Alloys," by F. E. Garriott, Ampco Metal, Inc.
"Static Strength Tests of Fillet Welds on Aluminum Alloy 61S-T Plate," by R. L. Moore, Aluminum Co. of America.
"Welding of Bronze Gears with a Steel Web and Hub," by Otto D. Klug, Alloys Welding Specialists Co.

SHIP STRUCTURES RESEARCH
(Ballroom)

EARL R. PARKER, chairman; FINN JONASSEN, vice-chairman.
"The Work of the Ship Structures Committee," by Rear Admiral Ellis Reed-Hill, chairman committee, U. S. Coast Guard.
"Tests of Various Designs of Welded Hatch Corners for Ships," by E. Paul DeGarmo, University of California.
"Correlation Investigations of Small Specimens with Wide Plate Tests," by Maxwell Gensamer, E. P. Klier and S. C. Wagner, Penn State College.
"A Method of Evaluating Transition from Shear to Cleavage Failure in Ship Plate and Its Correlation with Large Scale Plate Tests," by Noah A. Kahn and Emil A. Imbembo, New York Naval Shipyard.

Thursday, October 23

9:30 A.M.—Simultaneous Technical Sessions

LOW ALLOY STEELS
(Louis XVI Room)

O. B. J. FRASER, chairman; A. M. UNGER, vice-chairman.
"Factors Affecting Weldability of Carbon and Alloy Steels," by C. E. Jackson, K. H. Koopman and C. M. Offenhauer, Union Carbide & Carbon Research Labs.
"Submerged-Melt Welding of Steels of High Hardenability," by E. A. Clapp and E. L. Frost, Union Carbide & Carbon Research Labs.
"Macro-Etching and Photomacrography of Ferritic and Austenitic Welded Joints in Low-Alloy Steel," by O. O. Miller and E. G. Houston, United States Steel Corp.

MISCELLANEOUS
(Crystal Room)

J. LYELL WILSON, chairman; ROSS J. YARROW, vice-chairman.
"Design of Arc-Welded Steel and Its Relation to Cost," by R. H. Davies, Lincoln Electric Co., and motion picture.
"High-Speed Technicolor Motion Picture of Welding Arc," by G. E. Claussen, Reid-Avery Co.
"High-Speed Heliarc Welding," by H. E. Rockefeller, The Linde Air Products Co.
"Stud Welding," by R. C. Singleton, Nelson Sales Corp.

STRUCTURAL
(Ballroom)

T. R. HIGGINS, chairman; A. F. DAVIS, vice-chairman.
"Design and Construction of Welded Research Laboratory Building," by LaMotte Grover, Air Reduction.
"Shape-Welding by the Submerged-Melt Process," by J. A. Kratz, The Linde Air Products Co.
"Investigation on the Effect of Paint on the Quality of Fusion Welds in Structural Steel," by R. W. Bennett, R. D. Williams and C. B. Voldrich, Battelle Memorial Institute.

Thursday Evening—Annual Banquet

Friday, October 24

9:30 A.M.—Technical Session

INERT-GAS WELDING
(Louis XVI Room)

HENRY O. KLINKE, chairman; A. M. CANDY, vice-chairman.
"Mechanized Inert-Gas-Shielded Arc Welding," by H. T. Herbst, The Linde Air Products Co.
"New Applications of Inert Arc Welding," by R. W. Tuthill, General Electric Co.

2:00 P.M.—Business Session
(Crystal Room)

3:00 P.M.—Board of Directors Meeting
(Room 118)

Fig. 1—This is the Burdox city service store, Cleveland, where retail customers can obtain anything they want in the way of welding, flame-cutting or industrial safety equipment. Note the large, full-length show windows

DISTRIBUTOR for Successful Welding

Burdett Oxygen Company is a distributors' distributor which serves nearly 2,500 wholesale customers and stocks a line of 1,500 items. Its territory is the world. A local retail store is also operated.

BY CLYDE B. CLASON

BURDETT OXYGEN CO., is unique of its kind. A wholesale business serving welding distributors all over the world, a retail business serving the Cleveland trade area and a manufacturing plant operate amicably under one roof—or series of roofs—located at 3300 Lakeside Ave., Cleveland.

The wholesale division has almost 2,500 customers in the United States and covers the entire world through its rapidly growing export department.

The retail division operates a complete, ultramodern department store for welding products.

OTHER ACTIVITIES

The manufacturing division produces oxygen, acetylene, nitrogen, hydrogen, pyrolene and carbon dioxide. In addition to these gases, brass bushings, hose and cylinder connections and cylinder trucks are also manufactured.

Besides its Cleveland plant, Burdett Oxygen has a store, office and warehouse at 316 West Seventh St., Cincinnati. Warehouses for oxygen and other gases are also maintained at Toledo and Youngstown, O., and at Jamestown, N. Y. A Burdett subsidiary, California Air Products, of Huntington Park, manufactures and distributes oxygen and acetylene in the Southern California territory. Another subsidiary, American Industrial Safety Equipment Co., Brooklyn, manufactures lines of welding and chipping goggles, welding lenses and other safety equipment.

It all adds up to Big Business, of a size and scope that could scarcely have been foreseen by William H. Loveman when on February 17, 1923, he started a small electrolytic oxygen plant that occupied approximately 6,000 sq ft of space and employed five workers. Next year—on March 1, 1948—Burdett celebrates its 25th anniversary in the welding business.

In 1938 Burdett began operations as a distributor of welding equipment. The first lines to be handled were cylinder connections, hose connections and outlet bushings of the company's own manufacture. Later cylinder trucks, also of Burdett manufacture, were sold along with oxygen and the other gases.

In March, 1942, Burdett became Ohio distributor for a nationally known line of arc welders and other equipment. Along about the same

Fig. 2—Interior of the city service store. Behind the 60-ft counter are over 500 linear feet of steel bins, holding some 1,500 different items. The store occupies a 66 by 120 foot ground space in a building of its own

DISTRIBUTORS

time a full and complete line of "Burdox" oxy-acetylene welding and cutting equipment was being made to Burdett specifications.

To accommodate these various additions, the company's factory, facilities and services had to be expanded and re-expanded. Modern offices were built above the original one-story oxygen plant at 3300 Lakeside Ave. An adjacent four-story warehouse building was occupied in 1940, and the new city service store, connecting the two buildings into an integral unit, opened for business in February, 1946.

The Men Behind It

Mr. Loveman is still serving as president and general manager. Among other men who have played a dominant part in the company's growth are: Eugene J. Morse, vice-president in charge of sales; Joseph F. Wagner, vice-president in charge of production, and Norman Carl, sales manager. Mr. Morse has been with Burdett for 22 years, Mr. Wagner for 16 years and Mr. Carl for 11 years. Working under the coördination of Mr. Loveman, these men and their associates have built up a smoothly functioning organization.

A visit to the Burdett plant early discloses that there are no brass hats here—just real human beings and good fellows. Pomposity and self importance are qualities that are conspicuously absent in everyone from President Loveman on down. The human touch is perhaps the real reason why distributors like to visit here. They come in from all sections of the country, 20 to 25 of them a week or more, confident that they will receive a sincere, friendly welcome which will have nothing to do with the amount of business involved in their calls.

At Burdett, the sales department includes the traffic department, the bookkeeping department and the whole office force if need be. Keeping the entire organization sales-minded gives it a different outlook, makes it more human to deal with, company executives state.

To supplement the efforts of its sales force, Burdett maintains an engineering department whose services are available on all types of welding and cutting problems. "We like to feel that we are serving rather than selling," stated the company's twentieth anniversary booklet, "for with this concept we can hurdle many of the normal sales barriers and render expert counsel, give suggestions and recommendations out of our experience that save time and tempers, increase production and quality."

Cleveland Plant and Warehouse

Including a separate acetylene plant, the present Cleveland facilities total 300,000 square feet of floor space. The oxygen plant is now a two-story building, with sales and executive offices located above the

Distributor Operations-6

original one-story building in which oxygen is manufactured. These are magnificent offices: air-conditioned, fluorescent-lighted and lined throughout with wormy chestnut paneling, a deluxe wood that has hitherto been reserved almost exclusively for the private offices of Hollywood moguls. Restaurant facilities are provided for the benefit of office workers. Visiting distributors are entertained in a large, handsome conference room.

East of the oxygen plant and office building is the one-story city service store, newest addition to the company's facilities. Eastward again is the large four-story building which Burdett acquired during the course of its expansion program. Cylinder receiving and shipping is handled on the ground floor of this building, leaving three upper floors and the basement for warehousing and manufacturing activities. An entire floor is devoted to the storage of arc welders.

Welding Store

The Burdox city service store has a separate building of its own, occupying a ground space of 66 by 120 feet. Before it was built, Messrs. Loveman, Morse, Carl and Wagner personally toured the country in quest of good retail selling ideas and incorporated every one that they could find or think of. They are certain that this is the finest store of its kind in the United States today, and there are many who will agree with them.

Show Windows and Storage Bins

The exterior (Fig. 1) is notable because of its large front show windows and ample parking space for customers' cars. Each of the show windows is a single huge sheet of plate glass, allowing an unobstructed view of the entire store interior from outside.

Stepping through the front door, a customer enters the streamlined sales room shown in Fig. 2. Behind the 60-foot counter may be glimpsed some of the steel stock bins which were made to the company's own specifications. There are 17 rows of such bins, each 30 feet long, making over 500 linear feet of 6-ft-high shelving for the storage of merchandise. Every item is labeled twice: once with the catalog number and once with an accurate description of the part. Even though some 1,500 different items are stocked here, the inventory record is never more than 12 hours behind the actual stock.

Both floor displays (Fig. 3) and counter displays (Fig. 4) are periodically changed and rearranged to insure good exhibition of all the major welding and cutting products. At the time of the writer's visit, flame-cutting machines of the straight-line and circle-cutting types were receiving emphasis in the key floor space immediately behind the show windows.

This store is in every sense of the word a "department store for welding," and it is in charge of a merchandising expert who has a thorough understanding of the subtleties employed by department stores to boost their sales curves. A typical Burdett merchandising idea is the packaging of cutting tips in transparent plastic containers. This enables the customer to assure himself of the condition of a tip without the bother of tearing open the top of a cardboard container. Furthermore, it means that the containers will always look like new no matter how many times customers have handled them.

Stock and Personnel

The city service store stocks everything that its welding customers might need—welding and cutting outfits, soldering and brazing outfits, lead-burning outfits, torches, gauges, hose, goggles, lighters, welding rods and electrodes, arc welders, helmets, gloves, safety clothing and a multitude of other products. Every item that the company warehouses and

Fig. 4—Larger items of equipment such as arc welders receive featured treatment in the floor space between the show windows and the sales counter

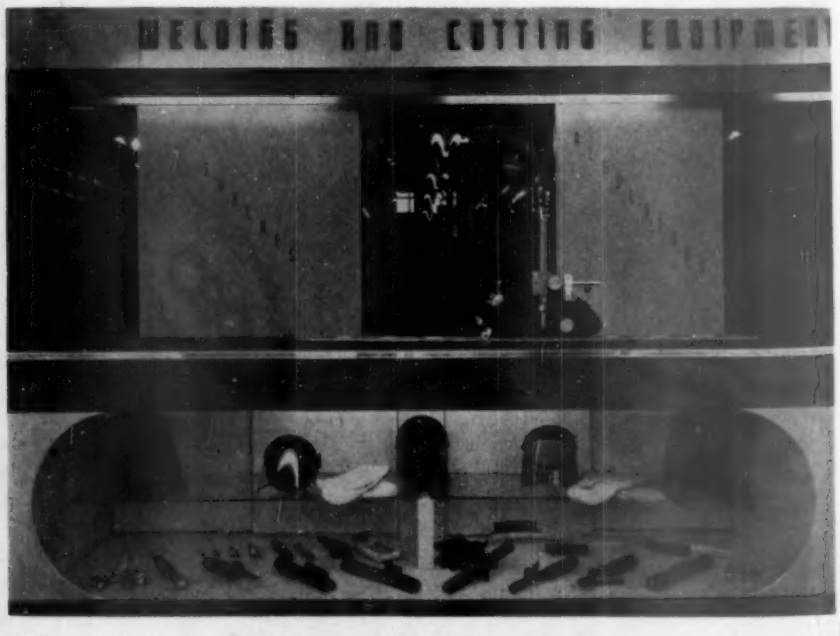


Fig. 3—Showcase displays are regularly changed and rearranged in accordance with the best tenets of department store merchandising

The big four of Burdett Oxygen. Left to right are: William H. Loveman, president; Eugene J. Morse, vice-president in charge of sales; Joseph F. Wagner, vice-president in charge of production; Norman Carl, sales manager

sells to its wholesale customers can also be obtained at the city store.

The store is staffed by welding experts, who are always glad to give authentic advice on welding or cutting problems. All of these men are ex-G.I.'s, who are there under an on-the-job training plan that constitutes a two-year practical course in sales engineering. Besides waiting on customers, the trainees work in various departments such as the shipping department where they learn to handle the equipment that they are selling. Four of the sixteen who originally started in the program have already graduated to sales; the remaining twelve are still working in the store or in other departments.

The company now has eleven retail salesmen who call upon steel mills and scrap iron yards, chemical and oil industries, plumbing shops, foundries, railroads, welding job shops and other customers in the Cleveland trade area. It is the plan to use the city service store as the practical training ground for this sales force.

To supplement its retail selling activities, Burdett advertises in such magazines as *The Clevelander* and the *Midwest Purchasing Agent* as well as in the bulletins and journals of local engineering societies. The company also uses daily reminder ads in Cleveland newspapers plus occasional larger space on specific equipment items. To this is added the consistent use of newspapers in the smaller communities of the Cleveland trade territory and display advertisements in classified telephone directories.

Whether it be advertising or salesmen who are responsible, the Burdox store has never lacked for business since its opening in early 1946. Customers drive in from all over Ohio as well as from western Pennsylvania and Michigan communities within a radius of about 300 miles from Cleveland. Because of the many out-of-town customers, week ends are particularly busy times. On Saturday mornings the entire 60-ft length of the sales counter may be jammed three deep with customers awaiting their turns to purchase welding supplies and equipment.

The company publishes a 64-page, letterhead-size catalog, attractively printed throughout in black and yellow, which illustrates and describes all of the items that may be purchased at the store or ordered through retail salesmen.

Wholesale Division

Burdett Oxygen draws a very strict line between its retail and its wholesale business. Even a very large retail customer cannot obtain the discount given to wholesalers. This policy protects the re-seller on price and keeps him from the unhappy position of competing with his own supplier.

Burdett has no sales force calling on wholesale customers. All of this business is secured entirely by direct-mail selling, conducted from the office of Vice-President Morse. Every two weeks a promotional piece of some sort goes out to a mailing list of between 2,000 and 2,500 welding distributors located all over the United States. Separate mailing programs are sent to each of three classifications of wholesale customers: (1) mill supply houses; (2) auto supply houses and (3) simon-pure welding distributors, the last-named being in the majority.

Special leaflets are issued from time to time to keep Burdett distributors posted on the company's outstanding buys. A recent example of this was the purchase of 45,000 helmets, complete with welding lenses, from the War Assets Administration. The savings derived from the large-quantity purchase were passed along to distributors, who were thus given the opportunity to reap extra profits. Burdett sold as many as 1,000 a day of these helmets until the stock was exhausted. Government-surplus welding gloves were similarly purchased and offered.

In addition to its mailing pieces, the company's promotional efforts to wholesalers include the distribution of such advertising novelties as calendars, key cases, pencils, magnifying glasses and paper weights.

A separate catalog, entirely distinct from the retail catalog, is issued to wholesale buyers. This is a 28-page, letterhead-size booklet, printed in red and black, with different copy and different page layouts from the retail catalog. A Spanish edition of the wholesale catalog is also published for the benefit of Latin American customers.

The company's export business is already large and is steadily growing larger. Orders from cities all over the world are received from agents, who function much the same as welding distributors within the United States.

Oxygen Distribution

As earlier stated, the production of oxygen was the first business of the Burdett Oxygen Co., and it is a highly important specialized division today. Oxygen is furnished by the cylinder,

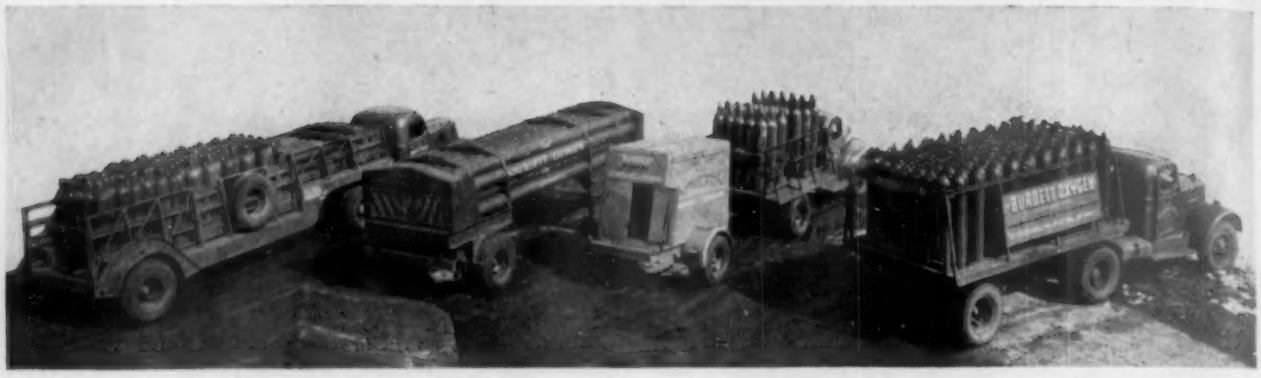


Fig. 5—Some oxygen delivery vehicles. Left to right are: 170-cylinder tractor-trailer unit for regular "store door" delivery of cylinders; 45,000-cu-ft-capacity tube trailer which is left on the customer's premises; 72-cylinder truck with 40-cylinder trailer or "jeep"; tank trailer with 150 cylinders manifolded together and delivered as a unit

by daily deliveries on a contract basis, in truckloads or in tractor-pulled manifold trailers. To deliver it, the company maintains a fleet of 64 vehicles of the several different types shown in Fig. 5.

On the extreme left of this illustration is the out-of-town tractor-trailer, which has a carrying capacity of 170 cylinders. Fourteen of these semitrailer units are kept in service delivering individual cylinders.

The next vehicle toward the right is the tube trailer (see also Fig. 6) for the delivery of 1,730-cu-ft tubes of oxygen to large industrial consumers. This trailer has no middle part—merely front and rear wheeled units to support the long oxygen tubes. There are eight such trailers in service, each carrying 26 tubes—a total capacity of 45,000 cu ft of oxygen per trailer.

These tractor-pulled trailers are never unloaded but are left intact at customers' premises. The driver who makes the delivery merely hooks up the manifold to the customer's piping system and drives away, leaving the trailer supported upon its rear and auxiliary wheels. When all of the tubes have become exhausted, the trailer is picked up and a new set of oxygen-filled tubes is left in its place.

Burdett engineers have designed a special "changeover" unit, for use on either tube trailers or cylinder manifold installations, which automatically switches the flow of gas from the empty to the reserve side.

Returning now to Fig. 5, the two vehicles immediately to the right of the tube trailer are the 72-cylinder city delivery truck and the 40-cylinder trailer or "jeep," which is also left as a unit on the customer's premises. Burdett operates nine city trucks and 18 of the jeep trailers, each of the latter holding 12,300 cu ft of oxygen.

On the extreme right of Fig. 5 is the tank trailer, which delivers 150 cylinders manifolded together, a total capacity of 45,000 cu ft of oxygen. There are 15 of these vehicles in service.

Naturally, oxygen deliveries cannot be made from too great a distance. The company's oxygen and acetylene territory includes the state of Ohio, western Pennsylvania and western New York. Despite this limited service area, from 90 to 100 million cu ft of oxygen and from 15 to 20 million cu ft of acetylene are manufactured and sold every year.

Five other gases are produced and sold by Burdett. These are: pyrolene, a substitute for acetylene in certain operations: hydrogen, used for brazing, atomic-hydrogen welders and underwater cutting equipment; nitrogen, employed in some heat-treatment processes and "controlled-atmosphere" furnace brazing where an inert gas is required; carbon dioxide, used in fire extinguishers, carbonated beverages and for some special industrial processes.

Fig. 6—A better view of the tube trailer. The truck drives away, leaving the 26 tubes of oxygen supported on the rear and auxiliary front wheels

Equipment Manufacture

Burdett got into the manufacture of welding equipment almost by accident. The company was unable to obtain a satisfactorily priced line of brass cylinder connections and outlet bushings and so decided to make its own. To this manufacturing activity, there was shortly added the production of rubber-tired cylinder trucks with frames of welded tubing.

American Industrial Safety Equipment Co., Brooklyn, is now being operated as a separate division, but it is expected to be eventually brought within the fold of Burdett manufacturing. This company makes lines of protective goggles, spectacles, lenses and other safety products. A recent venture that is succeeding very well is the manufacture of sun glasses.

The story of Burdett Oxygen is the story of steady, healthy growth. As welding marches forward during the years to come, Burdett will undoubtedly travel with it.

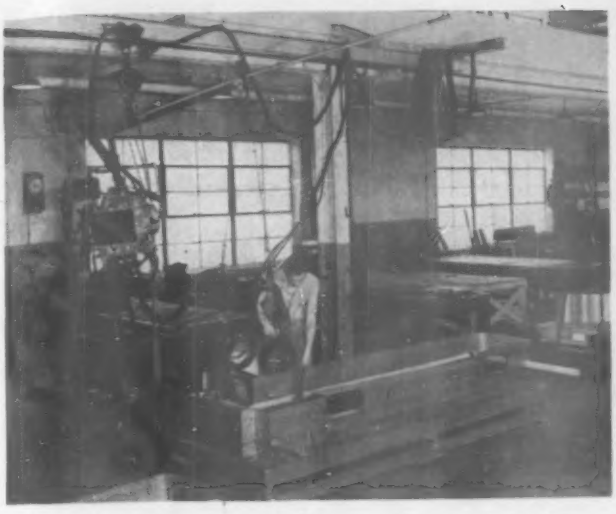


Fig. 1—This C-type gun is being used to weld reinforcements and mounting brackets in the box for a sign

Fig. 2—A push gun may be substituted for the C-type gun to do such jobs as welding clips to wide sheets

Spot-Welded Display Signs

A change-over to resistance welding has cut considerable time and labor from the production of large sheet-metal signs for display advertising

RESISTANCE WELDING has enabled Walker and Co., Detroit, one of the country's largest producers of sheet-metal display signs, to reduce construction time of its completed products. Standards of appearance have been maintained, and the welded signs are reported to be stronger than the former bolted and riveted ones.

Chief components of Walker display signs are frame, side, box, cover, mounting brackets and clips. The materials used include stainless steels, galvanized-coated steels, mild steels, etc., according to individual requirements. Weight of the various sheets varies from 24 to 16 gauge, while the structural steel reinforcements and support members are up to $\frac{1}{8}$ in. thick.

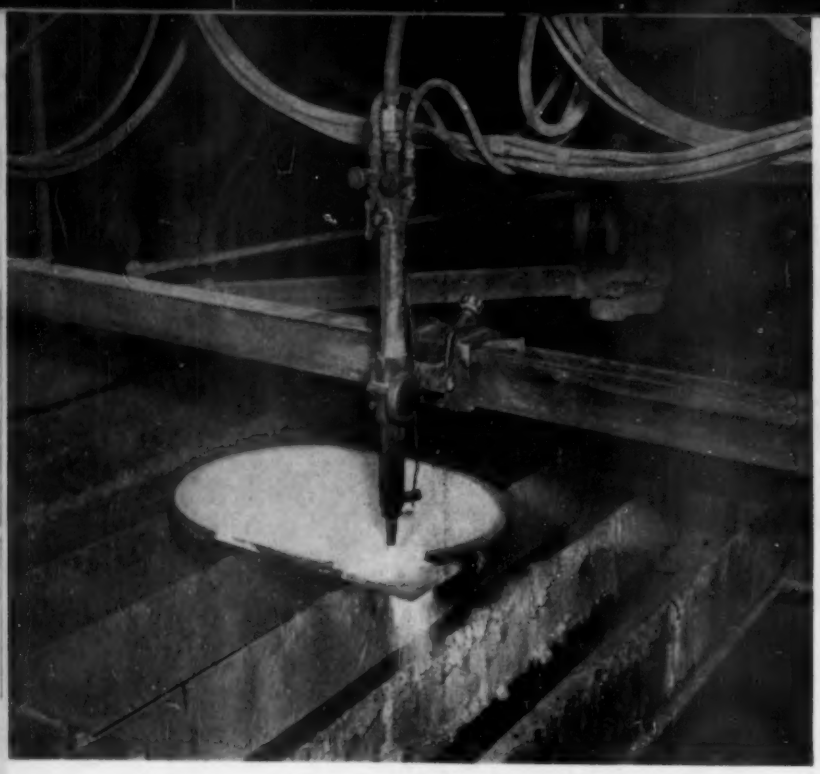
The equipment used was produced to meet Walker's specific product design and manufacturing problems. It includes portable welding guns and a fixed rocker-arm spot welder.

Fig. 1 shows the welding of reinforcements and mounting brackets in a sign box. The hydraulically operated 12-in. throat depth is ample to take care of the deeper sign boxes, some of which run up to 10 in. A push gun, part of the same equipment, is employed for such operations as spot welding clips to covers (Fig. 2). The push gun is also used for welding on sheets too wide for convenient handling in the fixed spot welder.

Fig. 3 illustrates the standard rocker-arm welder being used to spot weld clips to stainless steel letters in the formation of a large sign. This particular welder is used for a great variety of purposes. Extra-long adapters and special long electrodes make it possible to use the machine for work requiring a considerable amount of throat depth to clear flanges.

Photos courtesy Progressive Welder Co.

Fig. 3—Here a fixed rocker-arm spot welder is being used to join clips to large stainless-steel letters. These letters will later form a sign



Courtesy Struthers Wells Corp.

Fig. 8—Flux-injection cutting set-up for the production of manhole covers and flanges from type 347 stainless steel plates

Courtesy Smith & Caffrey Co.

Fig. 9—Cutting blades for a paper-making machine from 3/8-in. 347 stainless. See also Fig. 10

★ OPERATION

Flux-

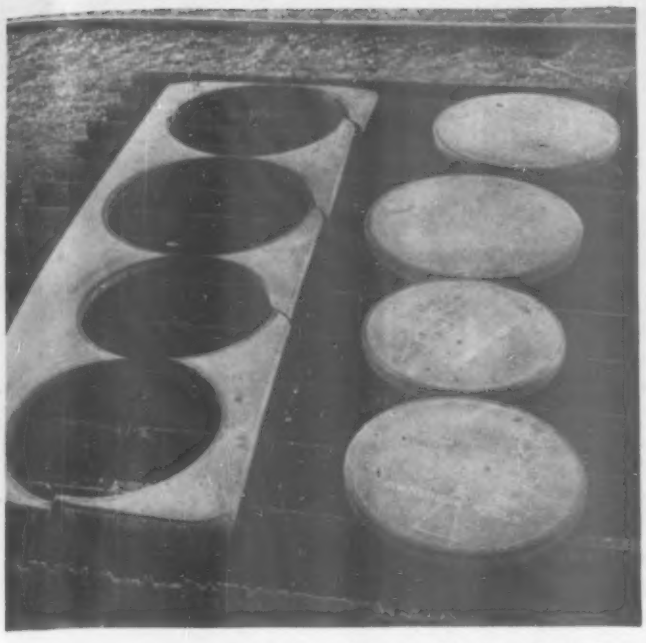
BY G. E. BELLEW
Steel Mill Specialist,
Air Reduction Co.

The flux-injection method of oxidation cutting of stainless steels has come a long way since its details were first released two years ago. From an interesting experiment, it has now become an established production technique in representative steelworking shops in many parts of the country. In last month's installment of this two-part article, Mr. Bellew discussed the basic principles of the method of feeding a pulverized, nonmetallic flux into the cutting-oxygen stream. He compared it in speed with both ordinary flame-cutting and machining, took up the problem of carbide precipitation and pointed out common mistakes of beginners in flux-injection cutting. The present and final installment is devoted entirely to production applications.

—THE EDITORS

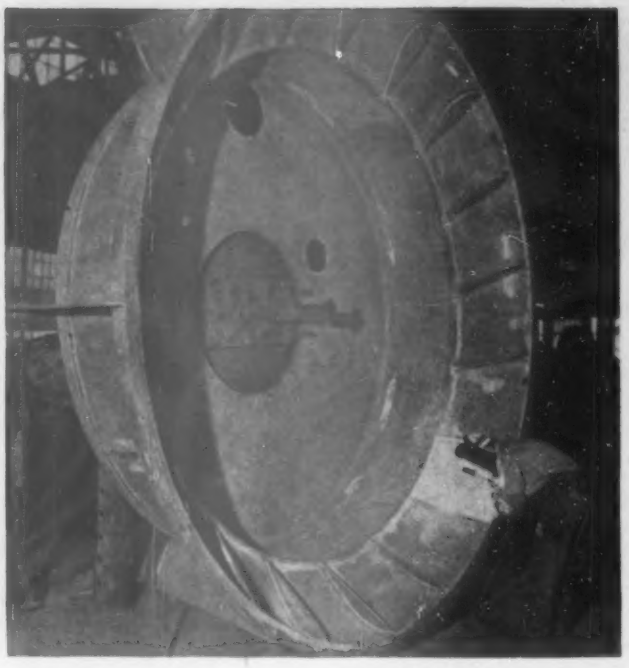
Courtesy Smith & Caffrey and The International Nickel Co., Inc.

Fig. 11—This subassembly for the paper-making machine makes use of segments flame-cut from the center of the head shown in Fig. 10. Each segment was drilled with an array of small holes before being mounted



Courtesy Struthers Wells Corp.

Fig. 7—These discs were flame-cut from stainless plate in less than a third of the time required to machine them, and, furthermore, salvagable scrap remains



Courtesy Smith & Caffrey Co. and The International Nickel Co., Inc.

Fig. 10—Welding the flame-cut blades (Fig. 9) into the curve of a flanged head. The center of the head was removed by flux-injection cutting (see Fig. 11)

Injection Cutting-II

Mr. Bellew continues his account of the new process which makes it possible to flame-cut stainless steels on a production basis by injecting powdered flux via the cutting-oxygen stream.

AVAILABILITY of an economical and reasonably simple method of flame-cutting stainless steels, one which gives both quality and flexibility, arrived at a particularly beneficial time for the producers and fabricators of stainless. With costs rising steeply, fabricators of these alloys could find good use for a process which radically reduces the cost of a fundamental operation.

This cost reduction was often of considerable proportions. Here is an example:

Pipe Sleeves

One machinery fabricator was cutting cast stainless pipe of 12-in. diameter and ⅞-in. wall thickness to short lengths for finish machining into sleeves. The cut was made by machining in 1½ hours. By making use of a power welding positioner to rotate the pipe in front of the torch, the cut was made in 10 to 12 minutes by flux-injection methods, producing four to five parts per hour. The finish machining operation was not affected.

Cutting Discs and Flanges

One of the first production applications of the flux-injection process was at the Warren, Pa., plant of Struthers Wells Corp. Fig. 7 shows a group of discs cut from stainless plate. These parts were previously turned out on a boring mill at the rate of four discs in four to five hours. When the flux-injection method was applied to the job, 14 discs were turned out in the same time, and handling steps were also reduced. Machining operations had required five crane lifts for each disc, but with flux-injection cutting one lift sufficed. Salvagable pieces of scrap were left, while the boring mill would have largely reduced the scrap to chips.

Fig. 8, another application of the process at Struthers Wells, pictures the use of a shape-cutting machine to turn out manhole covers and flanges for large tanks from type 347 plate. The finished parts show the clean contour and sharp corners characteristic of good flame-cutting work. As might be expected from the nature of the pieces, a large amount of machining was eliminated by flame-cutting.

Parts for a Paper Maker

Another fabricating plant using flux-injection as a regular production

tool is the Smith & Caffrey Co., Syracuse, N. Y. Not only stainless steel but heavy 20%-nickel-clad steel parts are cut by the process. Fig. 9 illustrates the mass production of blades for a large paper-making machine from type 347 stainless plate of ⅜-in. thickness. These foot-long pieces demonstrate the capacity of flux-injection cutting for making sharp points and smooth curves and also show the possibilities of precise layout work in reducing scrap to a minimum. As they come from the cutting table, these parts are ready for welding into the flanged part of a 20%-nickel-clad head, 12 feet in diameter (Fig. 10). The center of this head is removed by flux-injection cutting and further cut into six segments, which are drilled and fitted into a final subassembly (Fig. 11). Several other parts of this subassembly are also flux-injection cut.

Rings and Irregular Flanges

Standard parts such as rings and flanges are often needed in sizable quantities. Their routine production by flame-cutting is one of the most advantageous applications which the flux-injection process offers. Fig. 12 shows a typical set-up for producing flange rings from large plate with a shape-cutting machine equipped with a magnetic tracer. The flame-cut rings are machined to precise dimensions, but, as Fig. 13 indicates, a minimum of metal is left for removal by machining. For many purposes, the as-cut edge would be adequately good quality.

A similar application made possible a considerable saving in fabrication costs for the Industrial Welding Co., Hartford, Conn. Fig. 14 shows the irregular-contour flanges used in aircraft engine exhaust stack assemblies. These flanges were formerly stamped to shape from comparatively thin material. By switching the design to ⅜-in type 304 stainless plate, it was possible to cut the outside contour to finish dimensions. In spite of the heavier plate the cost of fabricating the flange into the final assembly dropped appreciably.

In the steel mills, flux-injection is also helping to hold down costs on fabricators' raw materials. Its uses in one large mill include ripping slabs 3 to 5 in. thick to size for rerolling; cutting 22-in. ingots for test purposes; cropping ingots; cutting scrap ingots to charging-box size. Thus, from the time the alloys are stripped from the ingot molds until they reach the point of assembly into a fabricated unit, flux-injection plays a part in reducing the cost and speeding the working of the stainless steels.

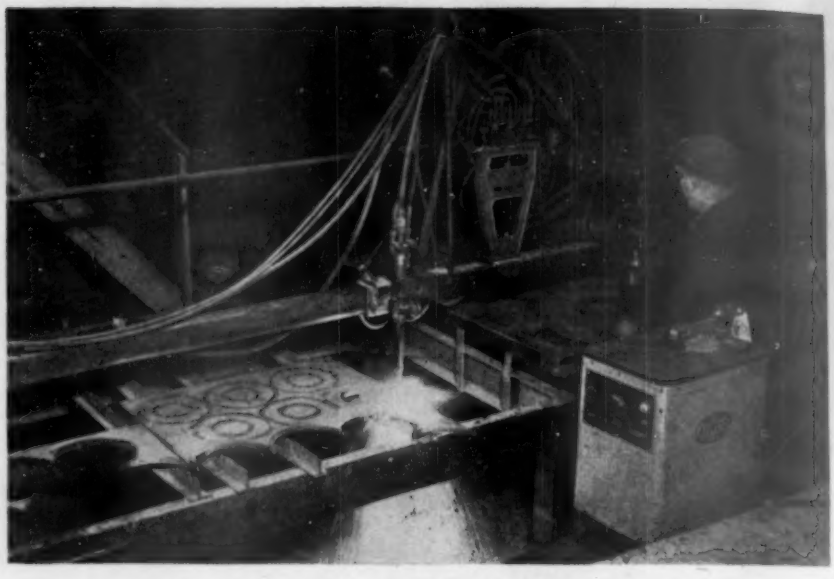
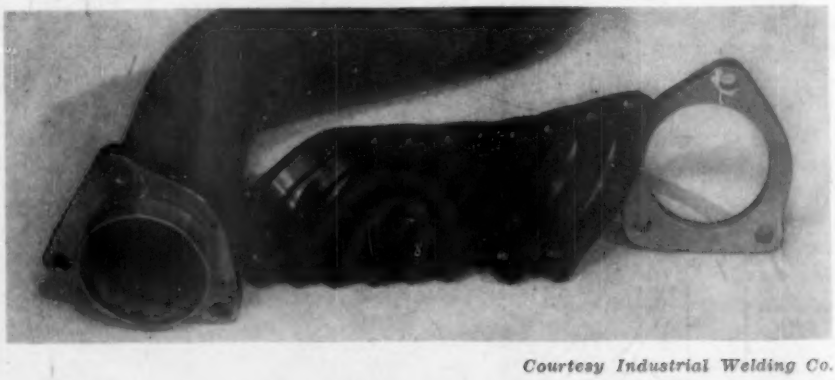


Fig. 12—Production cutting of multiple flange rings from a large stainless plate. A magnetic tracer is used with the flux-injection method

Fig. 13—Finish machining is required for the rings cut in Fig. 12. For many purposes, however, the flame-cut edge would be entirely satisfactory



Courtesy Industrial Welding Co.

Fig. 14—The flange for this aircraft engine exhaust stack was flux-injection cut from ⅜-in. 304 plates and replaced a previous stamped design

Operating as a production process, flux-injection cutting should provide for stainless the familiar advantages which have made such important changes in mild-steel operations over the past thirty years.

To visit the International Amphitheatre from AWS headquarters at the Hotel Sherman, walk two blocks east to State Street and take a southbound subway to Indiana. Change here for a Stockyards "L" and ride to the Halsted station

1947 Metal Show

Setting is the International Amphitheatre, Chicago, October 18-24 inclusive, for the first seven-day National Metal Congress and Exposition

Some 240,000 square feet of floor space have been reserved for the 350 or so firms who are scheduled to have exhibits at the coming 29th National Metal Congress and Exposition. The 1947 "Metal Show," principal trade show and technical society gathering of the metals industries, is being held for seven days beginning October 18 at the International Amphitheatre, W. 42nd and S. Halsted Sts., Chicago, under sponsorship of the American Society for Metals.

The October Metal Show is the sixth to be held in Chicago, previous years being 1926, 1930, 1935, 1939 and 1943. It is also the first of its kind that will extend over a longer period than five days. Former expositions, at Chicago or elsewhere, have opened traditionally on Monday and closed on Friday night. The 1947 show, however, will open on Saturday and continue until the following Friday night, thus adding two extra days of exhibiting.

Attendance during the first two days, Saturday and Sunday, will be by "invitation only," and the invitations will be confined to engineers and technical personnel from the Chicago area. Most out-of-town visitors will attend during the five days of technical sessions that begin on Monday, Oct. 20. Approximately 20,000 metals engineers and scientists are expected to be attracted to Chicago by the annual meetings of the four participating technical societies.

Convention programs will be held during the week by the American Welding Society (see also page 51), the Iron and Steel Division and Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, the American Industrial Radium and X-Ray Society and the American Society for Metals.

A two-day seminar on fundamental relations in the fracturing of metals will be held under ASM sponsorship at the Palmer House on Oct. 18-19.

One of the principal events of the week will be the annual banquet of the American Society for Metals, to be held on October 23 at the Palmer House. On this occasion the scroll and plaque of the Albert Sauveur Award, highest award for technical achievement conferred by ASM, will be given to F. P. Zimmerli, Detroit metallurgical engineer, for his "basic research in the field of shot peening to increase favorable stresses in the surfaces of metal parts."

Mr. Zimmerli is chief engineer of the Barnes-Gibson-Raymond Division of the Associated Spring Corp., Detroit. The process he developed consists of blasting metal surfaces with great numbers of small steel balls at velocities approaching that of rifle bullets. The resulting impacts harden the surface and greatly increase its fatigue life or durability. The method is being widely utilized today in the hardening of metal parts employed in applications ranging from aircraft and automotive engines to components for large electric turbines.

Another award to be made at the ASM annual banquet is the Gold Medal for 1947. This will be bestowed on Dr. C. H. Mathewson, professor of metallurgy at Yale University, for "outstanding metallurgical knowledge and great versatility." Third scientist to receive the Gold Medal since its inception in 1943, Dr. Mathewson is known for studies on alloys, crystallography and recrystallization of metals.

Mechanical drawing is taught as a basic requirement. Courses are also offered in mathematics and physical sciences

Education for

LeTourneau Technical Institute combines classroom instruction on the college level with paid part-time employment in welding

In last month's article, Dean Brooking related the thinking behind the establishment of the new LeTourneau Technical Institute and the objectives it expects to attain. He also discussed in detail the part-time employment phase of the dual educational program. The present installment covers the formal classroom instruction, which now comprises a three-year college course that could easily be extended to the full four years.

—THE EDITORS

BY WALTER J. BROOKING
Dean, LeTourneau Technical Institute of Texas, Longview, Tex.

THE OBJECTIVE of this plan of education is strongly utilitarian; namely, to make the recipient capable of competing successfully for well-paid employment and to foster continued growth in leadership. The program is not one of "operation training" but of education of a professional mechanic. Since it is directed toward the application of efficient and scientific processing in today's mechanical age, there is a considerable need for this type of education.

The educational heritage of our country has been largely the Liberal Arts colleges and universities, supplemented by the professional schools. The fundamental objective of a Liberal Arts education is the appreciation of culture. There is no question but that this type of education has served and will continue to serve our nation well. Our level of literacy is among the highest on earth, and our nation has grown and flourished. On the other hand, the vanishing physical frontiers and greater population of our nation have made imperative the development of mechanized mass production. Hence the contributions of the nation's mechanics, technicians and craftsmen have become vastly important to our present civilization.

These highly skilled production men, by the machines they have made, have lifted the burden of labor from the shoulders of the American people so that they have the highest standard of living and the shortest work day of any people on earth. They share this contribution with the professionally trained scientist, but theirs is the greater share. By the same token, the machines which they have created have produced much of the wealth which supports the Liberal Arts system of education. Yet these same mechanics, technicians and skilled production men probably receive the least direct benefit from the Liberal Arts education program.

The reason is that they, as a group, are probably less "abstract minded" than those who successfully complete programs of Liberal Arts education. The man with considerable mechanical aptitude is usually what might be termed "hand-minded" or "motor-minded" and would rather be tinkering with some concrete material, process or mechanical device than

Oxy-acetylene welding and brazing are among the subjects studied in the welding laboratory of LeTourneau Tech

Welding Personnel-II

absorbing abstract information from a printed page. Because of their preoccupation with things mechanical and lack of interest in more abstract things, many mechanically minded students are relegated to mediocrity or actual failure in the usual high school or college course.

Their problem is not lack of intelligence or innate ability, but rather an unfulfilled need for certain practical studies while they are in school and a lack of a good foundation for associative learning of school subjects at the time they are exposed to them.

LeTourneau Tech's plan of part-time paid employment associated with classroom work on the same day, each related to the other, is an attempt to provide a more adequate approach to the education of these most essential members of society.

The training of the welding students within the classroom provides formal college level education (and two years of academy level or preparatory school where necessary) in the subjects which form the science and supplementary education necessary to the welding engineer.

LeTourneau Tech began its present course of instruction in June, 1946. Already it has been recognized as a Junior College and with a two-year preparatory school by the Texas State Department of Education and the American Association of Junior Colleges. It is anticipated that development and growth of the school within the near future will allow it to provide a four-year accredited college course in science, thereby giving its students not only the essential education for their chosen field but also the advantage of an accredited college degree.

Welding Engineering Curriculum

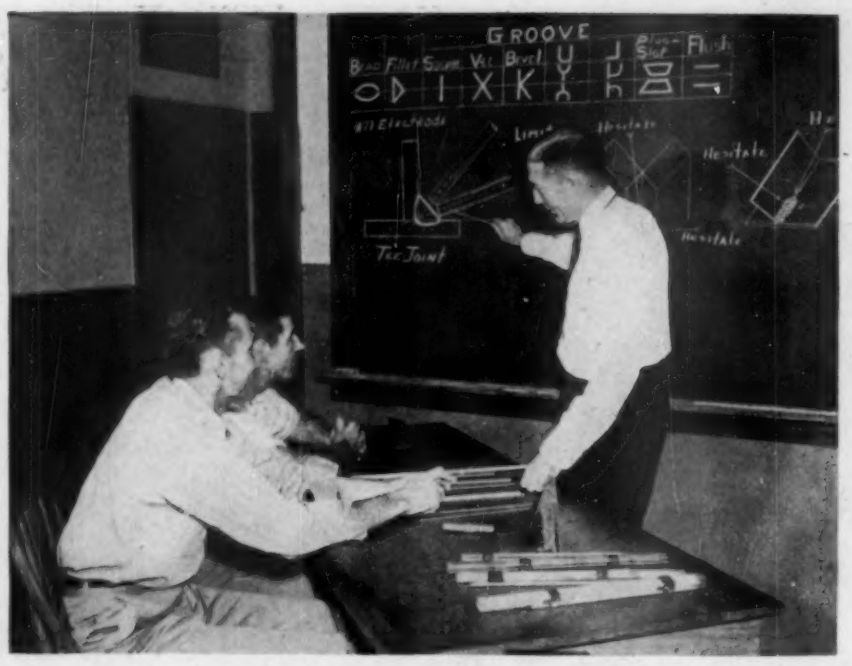
It seems as reasonable to be able to provide a scientific education specifically in the field of interest of a professional mechanic in Industrial Science as it is to give a four-year orderly education and a college degree to a school teacher, student of Business Administration or graduate of the usual Liberal Arts Course.

The present welding course consists of three college years of work (27 months), and it is expected that most students will want to spend an additional school year on subjects closely allied to the welding engineering course to allow them to become better trained specialists. The subjects now studied are: Mathematics on the college level to and including calculus, mechanical drafting and general engineering drawing, elementary physics, elementary chemistry, welding metallurgy and welding, economics, English, history and government. All of these courses are slanted sharply toward the students' special interest, and in addition to the foregoing courses, during the first two semesters, there is a course in welding theory which parallels the shop work.

The sequence of study of these courses is usually about as given in the accompanying program. The electives and related subjects may be studied by welding students and also taken to fill out the fourth college year.

Laboratory Training

The use of laboratories in teaching students of welding engineering is of utmost importance at LeTourneau Tech. Four distinct types of laboratories are used, including natural science laboratories, industrial



Formal classroom instruction on welding procedure, materials and control gives the student a realistic understanding upon which he may build

LETOURNEAU TECH CLASSROOM INSTRUCTION

First Year

115 Shop Process
113 Mathematical Analysis
113 Welding Science and Theory
113 General Engineering Drawing
125 Shop Process
113A College Algebra
113 Social Science
123 General Engineering Drawing
113 English

First Summer

213 Shop Process
123 Trigonometry
123 English
114 Physics

Second Year

225 Shop Process
124 Physics
213 English
214 Chemistry
315 Shop Process
213 Structural Layout and Design
223 English
224 Chemistry
123 Social Science

Second Summer

323 Shop Process
213 Government
223 Structural Layout and Design
3 Hours Elective

Third Year

3 Hours Material and Process
414 Shop Process
5 Hours Elective
123 Metallurgy and Welding Engineering

Elective and Related Subjects

113 Theory of Acetylene Cutting and Welding
313 Metals and Alloys
Tooling and Die Manufacturing
Physical Metallurgy
213 Metallurgy
223 Structural Layout and Design
213 D-C Current
313 A-C Current
Non-ferrous Metallurgy

science laboratories, a vestibule training laboratory and the main course objective laboratory work, which is done in the LeTourneau Company's factory.

1. Well equipped physical laboratories are available for teaching the various courses in chemistry and physics. These constitute the natural science laboratories.

2. A separate laboratory has been established and equipped for teaching arc-welding theory. This laboratory is equipped with a-c and d-c welders and table space for the demonstration and practice of special welding problems. Oxy-acetylene welding tips, torches and equipment are also available so that all common means of ferrous and non-ferrous welding may be performed.

As soon as they can be obtained, an automatic welding machine, an inert-gas-shielded arc welder and a metal-spraying unit will also be placed in this welding theory laboratory so that students may become acquainted with the methods and equipment for such welding. Thermit-welding equipment will also be added for demonstration purposes.

3. The special vestibule training laboratory enables the welding students to learn the essential elements of holding an arc and depositing weld metal. The student spends half of each day in this laboratory during half of his first three weeks in school. This is time spent without pay and is preparatory to the student's acceptance as a part-time employee by the LeTourneau Co. The vestibule period also serves for exploration and trying out so that the student may determine whether or not he himself believes that he is adapted to welding and welding engineering.

4. The actual experience of work in the shop discussed in Part I of this article, provides an especially fertile field of laboratory experience because of the LeTourneau Company's practice and policy in the use of arc welding.

Technical Library

A very essential part of the equipment of the Institute is its Library, which includes a broad and complete selection of books on arc welding, oxy-acetylene welding, metallurgy, electrical and mechanical engineering, chemistry, physics and allied subjects associated with welding. An

This special "Y" combines two 10-inch, standard weight, long radius welding elbows—TUBE-TURN Part No. 1, immediately available everywhere.
15" R
120° ± 1/2°

"A speedy, simple, satisfactory answer"

MANY'S the time when a long delay in getting a special fitting seems unavoidable. Many's the time when that fitting can be fabricated from TUBE-TURN Welding Fittings out of stock and give you the right answer—"speedy, simple, satisfactory."

The "Y" diagrammed above was put together with standard TUBE-TURN welding fittings, shown in Tube-Turn Catalog No. 111, and taken out of regular stock. This gave the designer what he needed when it was needed, in a hurry.

TUBE-TURN welding fittings are particularly suitable for piping fabrication because of the uniform wall thickness and full circularity which allows them to be cut and joined at odd angles, and because of uniformity from fitting to fitting. Order two, a hundred, or a thousand TUBE-TURN welding fittings of the same size and part number, and they will be dimensionally alike.

TUBE-TURN welding fittings and flanges are manufactured in more than 4000 types and sizes. They come in a wide variety of metals and alloys. For details, contact the nearest TUBE-TURN distributor. For his name, write to—

TUBE TURNS, INC., LOUISVILLE 1, KENTUCKY

District Offices at New York, Philadelphia, Pittsburgh, Detroit, Chicago, Houston, Tulsa, San Francisco, Los Angeles

TUBE-TURN TRADE MARK **tt** *Welding Fittings and Flanges*

important portion of this library is its file of trade journals and technical society journals, including THE WELDING ENGINEER, *Welding Journal, Metal Progress, Tool Engineer* and similar periodicals of interest to the metal-working trade. Catalogs of machine-tool builders, metal-product manufacturers and operator handbooks are also at hand for ready reference.

This library also serves as an important adjunct to the English and economics classes. The literature it contains may be used for classroom discussion and for improvement in the use of language at the same time that additional technical information is being added to the student's store of knowledge.

THE GRADUATE STUDENT

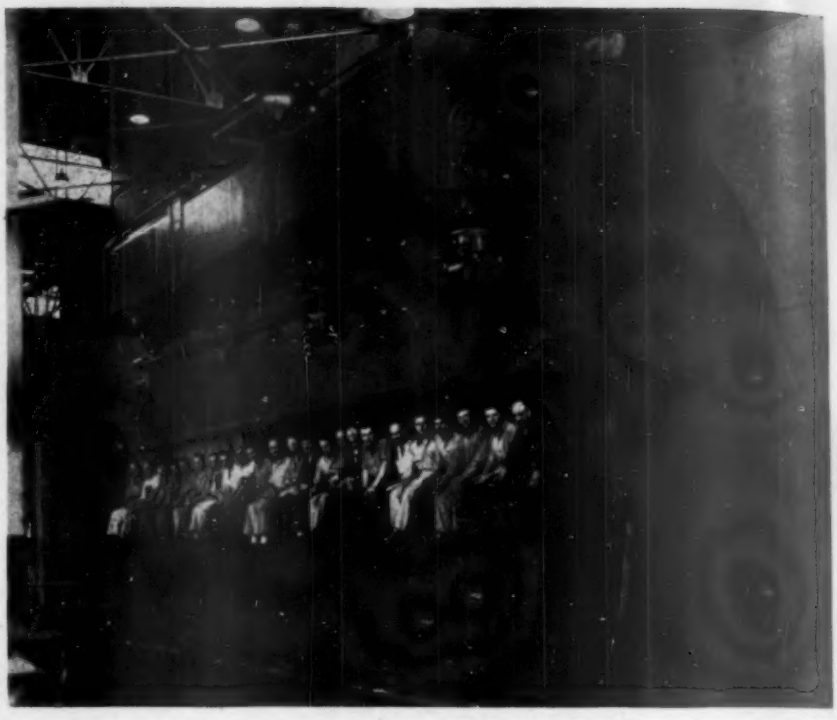
To summarize, the LeTourneau Technical Institute's plan combines the manual elements, the engineering elements and the supplementary elements such as mathematics, mechanical drawing, technical literature and English. The student securing such an education should be in a position to assume leadership in some place in his field within a short time after his departure from school. The fact that he is already a trained operator, with actual work experience extending over two to three years, puts him ahead of the usual mechanical engineering student, who must serve a two to three year apprenticeship with the organization which employs him before his broad-based learning becomes really profitable to him or his company.

The present welding engineer from LeTourneau Tech is not a full-fledged mechanical engineer. He is, however, a trained mechanic with manual experience, industrial experience and the essential engineering, technical and mechanical education to allow him to solve and answer the problems which lie beyond the realm of the usual welding operator.

Employment in the LeTourneau Company's various factories is not the primary objective of students in welding engineering at LeTourneau Tech. It is fully expected that a large number of the graduates from LeTourneau Tech will take their place in industry in their home town or other localities in the south and that the LeTourneau Company will have to compete with all the rest of the area to obtain and hold LeTourneau Tech graduates.

It is not anticipated that graduate students will immediately become plant managers, welding superintendents of large scale operation, etc., but it is expected that their experience, vision and college education in the specific business in which they are earning their living will enable them to forge ahead as trained personnel and leaders very much more quickly than the usual beginner in the welding field.

It is anticipated that there will be ample places for all of the trained welding engineers which can be produced by the school. The majority will probably be absorbed by the southern and southeastern states, considering the industrial development now under way in that area. Certainly men trained on an accredited college level in the business in which they are to make their living will be able to maintain themselves in the competition of our American industrial picture. They will, moreover, contribute much to our modern way of living.



World's Largest Press Brake

OF ALL-WELDED stress-relieved construction, a 250-ton press brake has recently been completed by the Warren City Mfg. Co., Warren, O., for the McKeesport, Pa., plant of the Jones & Laughlin Steel Corp. It is said to be the world's largest mechanical press brake.

This giant machine measures 36 ft long, 16 ft front to back and 20 ft high. It weighs in excess of 500,000 lb without dies and is designed to exert a pressure of over 1,000 tons for bending. A single stroke suthces to bend steel plate $\frac{5}{8}$-in. thick to a right angle, in plate lengths up to 36 ft.

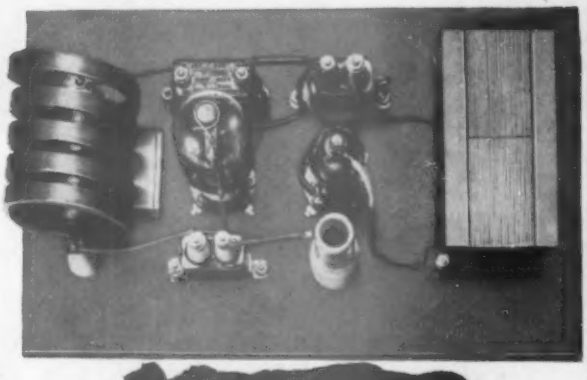
Engineers of Jones & Laughlin coöperated with the engineering department at Warren City in the design. The press brake makes 15 strokes per minute and has all moving parts counterbalanced by air cylinders. Its 5-ton flywheel is driven at 430 rpm by a 75-hp motor. Setting of the ram is electrically controlled by means of indicators that show the exact ram setting to one-thousandth of an inch. A push-button station operates the brake. All lubricaton is centralized.

Because of the great weight and size of this press brake, it was dismantled for shipment in five separate freight cars. Cars of special well construction were needed to provide the necessary clearance.

TRI-ARC PRESENTS THE NEW AND SENSATIONAL PILOT-ARC . . . HIGH FREQUENCY AUTOMATIC ARC

The ONLY *Electronic* Method Producing High Peak Energy With Vacuum Tubes

PATENTS PENDING



Completely ELECTRONIC WITH SELF-PULSATING OSCILLATOR!

Can Be Used On Any AC-DC Welder

See It Demonstrated for the First Time at Booth 1721 at National Metal Exposition at the International Amphitheatre in Chicago Oct. 18 - Oct. 24

• Here's What the PILOT-ARC Makes Possible . . .

- Use with Heliarc
- Automatic Arc on Any Heat from 1 Ampere Up
- Simplifies Arc Welding for the Beginner
- Welds Light Gauge Metals
- Saves current . . . Increases Speed of Welding
- Improvement of Welds
- Welds with Any Welding rod . . . bare or coated
- To Adapt Easily on any AC or DC Welder.

Eliminates RADIO INTERFERENCE!

★ Virtually eliminates radio interference as encountered in spark-gap type arc.

★ Generates high frequency power in discontinuous wave trains of high amplitude and small duty cycle.

★ Creates LARGE PEAK energies *(approximately 10 megacycles)* at time of need with small average power requirements.

NOTE: DISTRIBUTORS & DEALERS, Territories Open. Write For Full Particulars

TRI-ARC CORPORATION

6859 S. ANTHONY AVENUE • CHICAGO 37, ILLINOIS

★ OPERATION

Causes and Cures for Hot Welding Cables

Hot cables and electrode holders may be due to faulty connections. Test the circuit first for energy leakage. This article tells what you should check

BY R. L. TOWNSEND
Tweco Products Co., Wichita, Kan.

WHEN an inefficiency occurs anywhere in a welding circuit, it allows energy to leak out in the form of heat. An efficient, cool-running circuit is provided by welding cable of ample size tightly connected throughout, but it takes only one bad connection to make the whole circuit hot-running and inefficient.

Hot Machines and Cable

A welding machine that, in operator language, is "running hot" or has "turned cold" usually indicates an inefficiency somewhere in the cable circuit. Check the cables and connections before assuming that the machine is the cause of the trouble. Of course, loose connections in the machine or overload usage can cause burnout of winding, insulation or armature or studs.

When electrode holders, ground clamps, connectors, lugs or splicers run hot, they ordinarily do so because of being loosely attached to cables, or the cable may have broken strands which reduce its carrying capacity. Use of undersize equipment, corrosion and wear can also be contributing factors. Before condemning the machine or cable, check the following points:

1. Make a quick visual inspection of the entire welding circuit for cable breaks or "shorts."

2. Check lugs or terminals bolted to machine studs for tightness and possible corrosion of contact points. These lugs or terminals are often concealed under covers or on the backs of control panels where it is difficult to inspect them.

3. Eliminate the use of wing nuts wherever possible. Finger-tightened wing nuts loosen easily from cable. It takes a wrench to tighten a square or hexagonal nut, but tightness is assured.

Hot Electrode Holders

If the trouble is centered around a heating electrode holder, there is a good chance one of the following causes will be found:

1. Loose mechanical connection or attachment of cable to holder. All mechanical connections should be tightened after the holder has been in service for a short period of time.

2. Use of too small a cable for the amperage required. Use of light whip cables is the worst abuse. For top efficiency, the shortest length of cable practical for the work required should be used.

3. Insufficient jaw pressure. This may be due to faulty holder design, a weakened spring or a loose spring that does not provide the proper tension for the jaws.

4. Dirty or corroded jaw contacts. An occasional light touch-up with a three-cornered file eliminates this trouble.

5. Use of too small a holder or excess amperage beyond the holder's rated capacity.

6. Holders with worn or burnt-off insulation soak up more reflected heat from hot jobs than holders with good insulation. Some insulations actually hold absorbed heat in the holder.

7. Insufficient current transfer to upper jaw of tong-type holders due to shunt or pin corrosion or breakdown.

Hot Grounds

If the trouble is with a heating ground, look for these things:

1. Loose or broken cable attachment is the most common abuse. Next comes dirty contacts on the clamp, ground or work.

2. A ground placed at a point distant to the arc, such as the "common ground" used in many large shops, is very inefficient. Forcing current to travel through a moving contact is done at great loss and sacrifice of a stable arc in most cases.

3. Spring or pressure clamps placed on thin sections do not provide the jaw pressure needed for high-current work. Place the clamp on a thick section and as near the arc as possible.

4. Steel grounds lightly tack-welded for easy removal cannot carry the amperage of a heavy copper cable conductor.

5. Ground clamps of the spring or screw type dam up much current when installed on rusty, greasy or corroded surfaces. Provide clean contact surfaces.

6. Jaw-type ground clamps having cable attached to one jaw but not shunted to the other jaw can heat when the unshunted jaw is forced to carry current.

7. Use a low-conductivity material for the ground with insufficient contact area for current transfer.

Connections: Cable connectors, splicers, machine plug-ins or other cable connections should be checked

for loose cable attachment, tightness of plug or contacting parts and size for the amperage they are expected to carry. Never cut out cable strands to permit cable to be attached to equipment too small to accommodate the full cable.

Other Good Rules

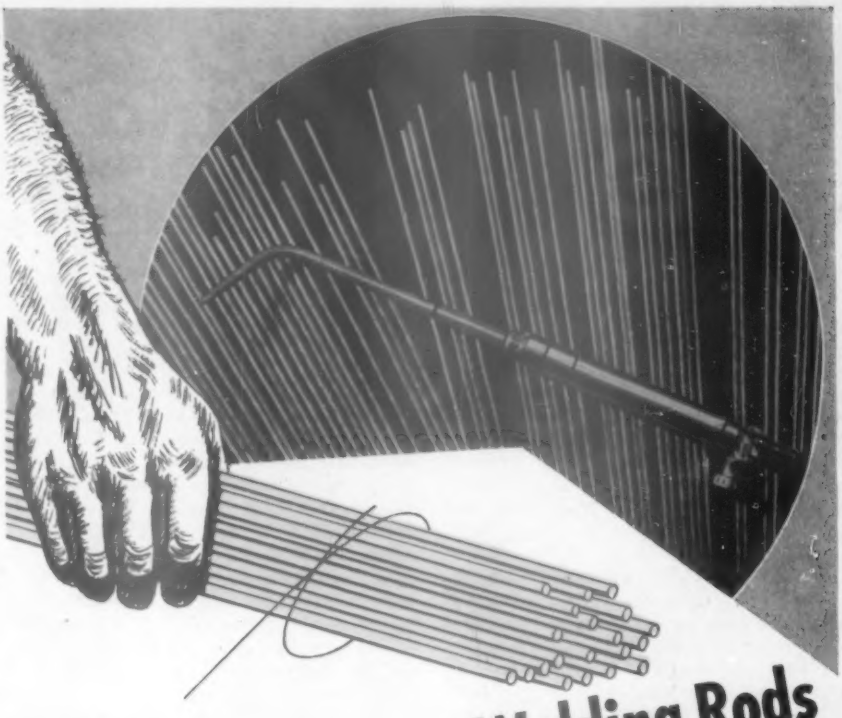
Amperage or Voltage Drop: Proper allowance for voltage drop should be made on long cable hook-ups. A good rule-of-thumb is to increase the cable by one size for each 50-ft extension from a normal 50-ft length start. This is true of both alternating and direct current, but the drop is greater on d-c. A long undersize cable will cause heating of the entire circuit. Avoid coiling of excess cable since this results in a magnetic field that costs current, produces heat and often leads to bad arc characteristics.

Resetting Cables: It is good practice to cut off a foot of cable when resetting any connection on the holder, ground, lug or connector. Constant flexing near these stiff joints can cause many fine wires in the stranding to break. The 12-in. setback is ordinarily sufficient to eliminate the affected section.

Solder Attachment: A good soldered connection can be relied on to carry current more efficiently than the average mechanical connection. Where high amperages are used, silver solder is recommended. Brazed joints are also efficient.

Mechanical Attachment: This method of attaching cables is advantageous for field operations and where heating equipment for soldered installation is not available. Mechanical or clamp connections will continue to operate even though they may run hot. Ordinary solders in such a case would melt and make a complete circuit failure. Mechanical connections that have been retightened after one expansion and contraction from heat through usage are very satisfactory.

Welding can be no better than the cables and cable connections that transmit the current to the point of deposition. Operators forced to cool their hands frequently or run back and forth to the machine to make adjustments cannot deposit the maximum footage of weld bead.



Titan Bronze Welding Rods

Ample stocks available for Immediate Delivery

TITAN Bronze Welding Rods can now be shipped immediately from stock. Regardless of the quantity you need, you can be sure of prompt delivery when you specify TITAN. Seven standard alloys meet every welding requirement . . . and ductile, strong, non-porous welds are assured by Titan's exclusive deoxidization process for the removal of injurious gases.

Write for New Folder

Our new 6-page folder gives you a concise description of TITAN'S Bronze Welding Rods, including their physical and chemical characteristics, and contains useful suggestions for making better welds. Write for your free copy today.

TITAN Metal MANUFACTURING CO.
GENERAL OFFICES AND PLANTS
BELLEFONTE, PA.

OFFICES AND AGENCIES
NEW YORK - CHICAGO - SAN FRANCISCO
LOS ANGELES - DETROIT - CLEVELAND
CINCINNATI - ST. LOUIS - MINNEAPOLIS
TULSA - DENVER - SALT LAKE CITY
ATLANTA - NEW ORLEANS
EXPORT OFFICE: 70 PINE ST., NEW YORK 5, N. Y.

Quality Alloys by Brass Specialists
Brass and Bronze Rod · Forgings · Die Castings · Welding Rods

News of the Industry

Welding Symbols on List of Joint Army-Navy Standards

THE War and Navy departments have approved the first list of a series of standards and specifications developed in accordance with an established procedure of the Army-Navy Joint Specifications Board. Among the list of JAN (Joint Army-Navy) standards are welding symbols (JAN-Std) and abbreviations for use on drawings (JAN-Std-12).

In addition to these approved standards, the board is also developing additional standards relating to drafting practices, including: JAN-Std-23, non-destructive test symbols; Jan-Std-20, welding nomenclature and definitions; JAN-Std-21, welding charts; JAN-Std-101, color code for compressed gas cylinders and pipe lines.

The JAN standards will be listed in the "Index of Specifications Used by the Navy Department" and in the "War Department Index Specifications" as they become available for distribution.

☆ ☆

Pennsylvania Railroad Opens X-ray Laboratory

To provide assurance against such internal defects as concealed cracks, imperfect weld joints and cavities due to shinkage of metal during cooling, Pennsylvania Railroad Co. has opened a new X-ray laboratory at Altoona, Pa., as an addition to the railroad's test department. Equipment includes a 250,000 volt-X-ray machine mounted on automobile wheels so that it may be used either in the specially constructed laboratory building or in adjacent construction and repair shops. A specially built dark room is provided for the immediate development of radiographs. Projection equipment is also included.

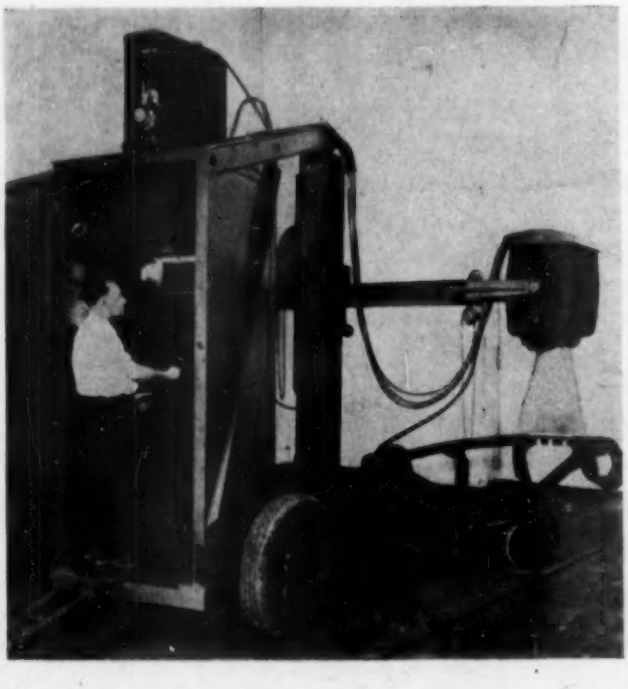
The railroad's further plans are for the installation of a permanently mounted million-volt X-ray machine. The new laboratory building has concrete walls 18 in. thick, permitting the use of equipment as powerful as 2,000,000 volts. Training of operating technicians and full development of a wide range of testing techniques will precede the installation of the million volt-X-ray unit.

X-ray testing of welded joints is particularly important today, say railroad officials, because of the increasing use of welding in the construction of high-pressure locomotive boilers, frames for Diesel locomotives, fabricated cylinders for steam engines and passenger and freight car truck frames.

☆ ☆

Welding Distributors Meet in Michigan

A ONE-DAY meeting of the National Welding Supply Association was scheduled to be held on Sept. 22 in Grand Rapids, Mich., as this issue of THE WELDING ENGINEER goes to press. Members and guests from Wisconsin, Illinois, Indiana, Ohio and Michigan were expected to be present.



Mobile 250,000-volt X-ray machine in the Pennsylvania Railroad X-ray laboratory at Altoona, Pa., examining the interior structure of the high-tensile steel used in a side frame for a high speed freight car truck. The technician stands at the controls, protected from possible injury by the lead-lined cab. The X-ray tube head, shown at the right of the photograph, directly over the side frame for the freight car truck, contains the tube and the necessary high voltage and cooling equipment. The cone attached to the tube head restricts the radiation and shields the surrounding area. The X-ray film is taped to the underside of the steel examined.

Reclassify Welding Patents for More Rapid Location

THE present large number of patents in the welding field—more than 11,000 have been recorded—makes it difficult for researchers to locate all of the patents pertaining to particular subjects. Hence, the Davis Welding Library, Ohio State University, Columbus, is switching from the present grouping according to the classes and subclasses of the U. S. Patent Office to a new system that will enable information on all patents granted in specific lines to be more readily obtained. Cost of this work is being paid from the A. F. Davis Welding Engineering Scholarship and Library Fund.

The reclassification is being accomplished under the direction of Dr. W. H. Simon, University of Toronto, who has done a large amount of work in the patent field. Dr. Simon was awarded a prize by the Institute of Welding, London, England, for his dissertation "Arc-Welding Electrodes and Their Relations to the Weld Metal." He is a member of the American Welding Society, an associate of the Institution of Mechanical Engineers and a member of the Ontario Association of Professional Engineers.

☆ ☆

Russians Weld War-Torn Bridges

SOVIET bridge builders have begun the job of restoring and constructing 1,800 war-damaged major and medium railway bridges, scheduled for completion by 1950. These bridges will total about 190 miles in length and require more than 500,000 tons of steel. Nazis bombings and artillery destroyed or wrecked some 16,400 Russian bridges totaling about 250 miles in length.

To facilitate the work of raising thousands of tons of demolished bridge girders from river bottoms, an effective process of underwater arc welding and cutting was developed and is being extensively used. Arc welding is widely practiced by bridge builders in this country, and a total of 176,000 tons of welded-riveted bridge girder systems are expected to be completed in accordance with the current Five-Year Plan. Russian experience here has shown that arc welding speeds up and facilitates bridge girder construction, reduces metal consumption by 15 to 20% and lowers labor requirements by 20%.

For the first time in the Soviet Union, ferro-concrete arches will be used in the reconstruction of a railway bridge in the Ukraine. Four such arches, each 460 ft long, will be erected to replace the demolished steel bridge girder systems that rested on concrete supports.

☆ ☆

To Rebuild Welding Equipment Warehouse

THE JOHN DEERE-LINDEMAN CO. has started construction at Yakima, Wash., of a $50,000 plant for forging, welding and sheet-metal work. The new building measures 74 by 184 ft and will replace a plant which was destroyed by fire a year ago. It is of steel construction with a corrugated asbestos roof.

Service at your elbow

on RAYTHEON WELDING CONTROLS

Non-Synchronous Controls

Junior and Senior Condenser Weldpower Units

High-Voltage Synchronous Controls

Low-Voltage Synchronous Controls

RAYTHEON WELDING CONTROLS built in the well-known "filing cabinet design," are flexible, easy to use, simple to service, tamper-proof and thoroughly accurate and dependable in operation.

In a matter of minutes, any user of Raytheon Welding Controls can secure authorized technical advice on his specific problem. Twenty-one Raytheon Factory Service centers, adequately staffed, are at your service.

Raytheon Factory Service representatives are thoroughly trained to provide expert aid by telephone, correspondence or field service. Even remotely located plants can be reached by air by one or more of these men in a matter of hours.

Write for detailed information on Raytheon Welding Controls

RAYTHEON

Excellence in Electronics

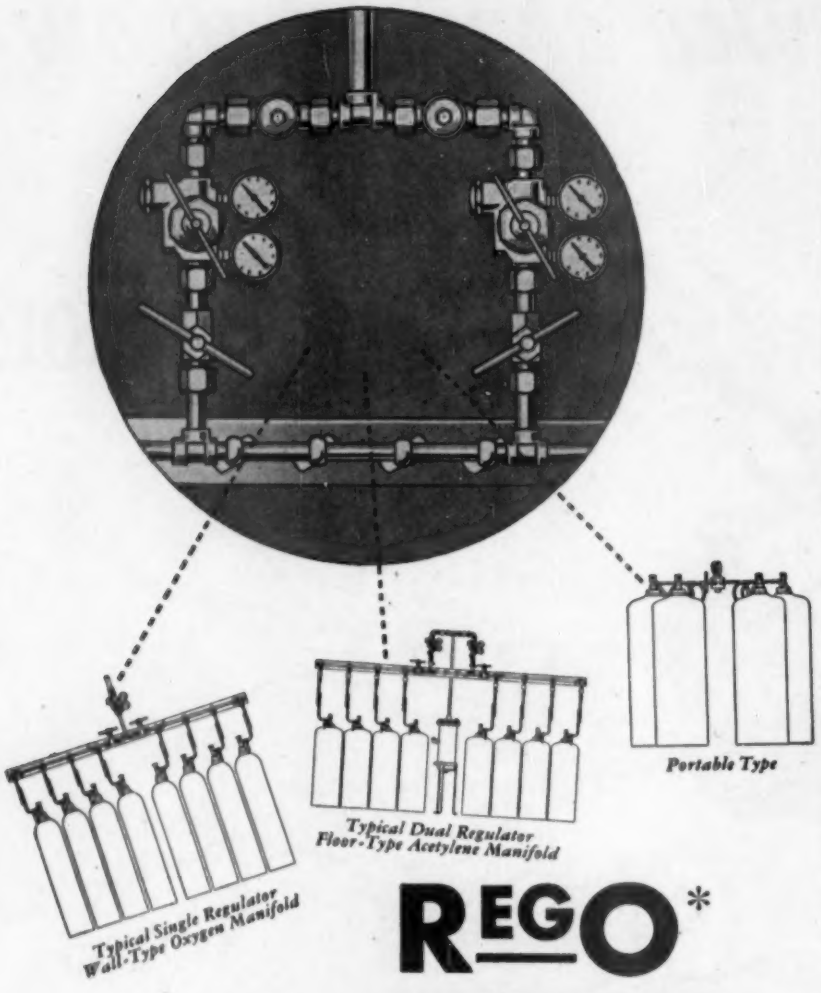
RAYTHEON MANUFACTURING COMPANY

COMMERCIAL PRODUCTS DIVISION

WALTHAM 54, MASSACHUSETTS

Industrial and Commercial Electronic Equipment, Broadcast Equipment, Tubes and Accessories

Sales Offices: Atlanta, Boston, Chicago, Cleveland New York


Portable Type
Typical Dual Regulator Floor-Type Acetylene Manifold
Typical Single Regulator Wall-Type Oxygen Manifold

REGO*

CONSTRUCTION

Produces Better Manifolds

● RegO design means safe performance, long life and low maintenance costs. Here are some of the construction features you get when you specify RegO Manifolds...

Unit Construction... The header section of each RegO Manifold is virtually one-piece; extra-heavy seamless brass pipe is run through the forged brass header fittings, the cylinder station shut-off valves and the master shut-off valves . . . all permanent connections are then silver-brazed. The header assembly is bolted to a heavy steel I-beam to assure permanent alignment.

Precision Regulation... large capacity two-stage RegOlators assure constant and uniform delivery pressure to the pipe system.

Extra Convenience... standard RegO Manifold construction provides individual shut-off valves at each cylinder station . . . this design permits any one cylinder to be disconnected without shutting down the entire manifold. Master shut-off valves control each main branch.

Rigid Tests... header pipe, valve bodies and fittings withstand pressure up to 10,000 psi and each complete RegO Manifold is subjected to a sustained air pressure test of up to 2,000 psi.

There Is A RegO Manifold to Fit Your Most Exacting Requirements

REGO MANIFOLDS *for* Oxygen • Acetylene • Hydrogen • Nitrogen
and other high pressure gases

*Reg. U.S. Pat. Off.

The BASTIAN-BLESSING Company

4201 W. Peterson Avenue Chicago 30, Illinois

Pioneer and Leader in the Design and Manufacture of Precision Equipment For Using and Controlling High Pressure Gases

To Conduct Research on Gas Behavior

RESEARCH to aid in organizing data on the standard properties of gases and gas mixtures is being sponsored as a project of the Engineering Foundation, New York City. Experimental studies and computations are being made at the Thermodynamics Research Laboratory of the University of Pennsylvania under the direction of Dr. John A. Goff of the American Society of Mechanical Engineers.

In announcing the project, Dr. A. B. Kinzel, chairman of the board of the Engineering Foundation, said that there has long been a recognized need for the organization of knowledge about the properties of gases and gas mixtures over the widest practicable ranges of temperature and pressure. "It is believed," he stated, "that the thermodynamic properties of gases can be calculated with high accuracy and thermodynamic consistency by the use of recent developments in recording mechanical theory."

The first phase of the program calls for a systematic recalculation of zero-pressure properties from the best available spectroscopic data. It is expected that as the work develops there will be an increasing number of cases in which the spectroscopic data will prove inadequate. Consequently, much of the former statistical information will have to be rechecked and more detailed facts acquired. After suitable zero-pressure properties have been obtained, the next step will be to determine the corresponding properties at finite pressures.

☆ ☆

Establish New Laboratory for Metallurgical Research

AN outgrowth of the Rockefeller Metallurgical Engineering building on the campus of the Case Institute of Technology, Cleveland, the recently established research laboratory on the third floor is expected to add new knowledge of the behavior of metals and alloys under stress and heat treatment. Dr. George Sachs, professor of Physical Metallurgy at Case Institute and widely known for his work on the plastic flow of metals, residual stresses and X-rays has been appointed director of the new laboratory.

The equipment of this research section makes it one of the most complete of its type in the engineering colleges of the country. Problems on which the laboratory group is working include flow and fracture of metals, analysis of various metal forming and joining processes, stress and strain analysis, heat treatment of steels and metal castings.

☆ ☆

National Cylinder Buys Texas Oxy-acetylene Co.

NATIONAL CYLINDER GAS CO., Chicago, has extended its manufacturing and distribution facilities into Houston, Tex., by purchasing the Independent Oxygen Co. of this city. An immediate expansion of facilities for the production of oxygen and acetylene is planned to keep pace with the rapid expansion of industry in this area.

He needs

REVERE No. 456 LOW FUMING

Bronze Welding Rod

WHY put up with bothersome fumes when you can produce strong welds quickly with Revere No. 456 *low fuming* bronze welding rod?

This "flame-tested" rod is particularly useful in joining, without fusion, base metals of higher melting points. In the welding of cast iron, Revere No. 456 saves time and fuel because its low melting point (about 1600° F.) reduces the need for high pre-heats and post-heats. And Revere No. 456 gives you sound joints in the bronze welding of cast and malleable irons, wrought iron, cast and wrought steel, cast and wrought bronze.

Other Revere Welding Rods are: RevereBronze380, ManganeseBronze, Herculoy, Phosphor Bronzes, Brass (Brazing Rod), Silicon Deoxidized Copper and Electrolytic Copper. All come in 100-pound cases or in 25-pound cartons, net weight, and are stocked by Revere Welding Rod Distributors in all parts of the country. Write for folder giving technical data and net prices.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

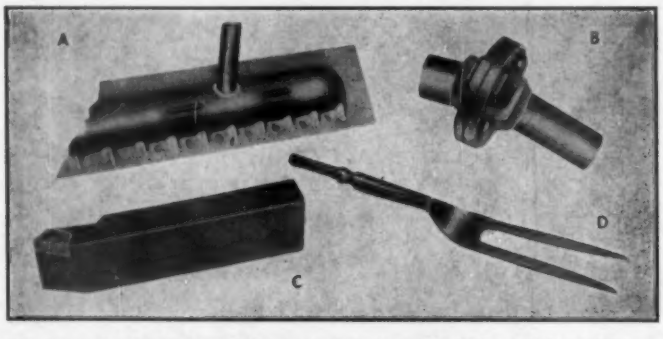
Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N.Y.—Sales Offices in Principal Cities Distributors Everywhere.

Give Your Production a Lift with APW

NO. 217 SILVER BRAZING ALLOY

APW No. 217 is tops for low temperature production brazing of steel, stainless steel, alloy steel, copper, brass, bronze, Inconel and monel metal. Only small amounts are needed to make clean, sound, leak-proof joints.

Tested and approved by leading manufacturers . . . here are a few typical applications:



A-Stainless Steel & Copper Refrigerator Sub-Assembly. B-Brazed Steel Universal joint. C-Carbide Tool Tip brazed to Shank. D-Stainless Steel Fork Assembly.

APW NO. 217 ALLOY IS FURNISHED IN WIRE COILS, STRIP, SHEET, WIRE RINGS, WASHERS, DISCS AND SPECIAL INSERTS.
ANY FORM • ANY SIZE ANY QUANTITY

THERE'S AN APW LOW TEMPERATURE SILVER BRAZING ALLOY FOR EVERY PURPOSE

APW No. 369 PASTE FLUX

Gives maximum protection to metal surfaces being joined and actively promotes flow of molten alloy. Easily soluble in hot water.

Send for our new folder 45W.

THE AMERICAN PLATINUM WORKS
231 NEW JERSEY R.R. AVE., NEWARK 5, N. J.
PRECIOUS METALS SINCE 1875

ASTE to Hold Meeting in Boston, Oct. 30 to Nov. 1

SOME 3,500 convention guests from the United States and Canada are expected to attend the semiannual convention of the American Society of Tool Engineers, to be held Oct. 30 to Nov. 1 in Boston's Statler Hotel. The entire mezzanine floor will be given over to the three-day meeting of technical sessions. In addition, more than 20 different industrial plants in the Boston area and the engineering laboratories of the Massachusetts Institute of Technology will be opened for tours by convention visitors.

☆ ☆

Fabricate Stainless Vessel for Milk Storage Purpose

STEADY employment for 8,000 more cows in the middle west has been made possible through the combined efforts of the John Nooter Boiler Works Co., and the Pevely Dairy Co., both of St. Louis. The metal-fabricating firm recently delivered to the dairy the first two of four 8,000-gallon storage tanks fabricated of 12-gauge, 302 stainless steel. These 15,000-lb tanks are 8 ft in diameter, 20 ft long and have a total capacity sufficient to store milk for a city of 300,000. Filling each tank requires the efforts of about 2,000 cows.

Of Nooter design, the new milk storage tanks are polished to sanitary finish. Each contains two agitators which stir the milk and prevent cream separation. Sight and light glasses enable viewing of the interior of the vessel. A manhole, 18 by 22 in., is provided at one end of the tank for the use of the workmen who daily clean and sterilize the interior.

☆ ☆

Color Scheme Aids in Use of Fire Extinguishers

PYRENE MFG. CO., Newark, N. J., has adopted a color scheme for its various fire extinguishers in order to save time when selecting the proper material for fighting certain type fires. These colors have been selected to provide instant, positive identification. They are: bright blue, a soda-acid and cartridge-operated water-type extinguisher for Class A fires (wood, paper, textiles and other ordinary combustibles) in locations not subject to freezing; bright red—foam—for class A and B fires (gasoline, oils, lacquers and other flammable liquids); dark green—pump tanks, cartridge-operated anti-freeze extinguishers for class A fires in locations subject to freezing; reddish brown—vaporizing liquid for class B and C (electrical equipment and wiring, calling for a non-conducting extinguishing agent) and small class A fires.

All nameplates, ringcaps and handles are painted with identifying colors to help workmen in selecting the correct extinguisher.

☆ ☆

SESA Meeting in New York, Dec. 4-6

THE annual meeting of the Society for Experimental Stress Analysis will be held at the Hotel Pennsylvania, New York City, on December 4, 5, and 6. Inquiries should be addressed to the Society, P. O. Box 168, Cambridge 39, Mass.

See McKay's new AWS-6013 Electrode developed after intensive research and experiment. Learn how it can serve you in production welding. We believe this electrode is a worthy companion to the McKay Electrodes already developed. Try it at our booth . . . then order it for more exhaustive production testing in your own plant.

See the advancements McKay has made in stainless-steel electrodes. Its AC-DC coating for electrodes has broadened the field of applications for AC welding to include the entire range of low-chrome, high-chrome and chrome-nickel steels.

See "on the spot" welding with the newly developed McKay Electrodes. Better still—take over yourself and make your own tests in our welding booth. Samples of the complete line of McKay Mild-Steel, Special-Purpose and Stainless Steel Electrodes will be available for testing.

Bring your welding problems to the show

McKay Welding Engineers in Booth 2636 will gladly work with you on all special electrode problems and applications.

THE McKAY COMPANY
405 McKay Building
Pittsburgh, Pa.

McKAY EXHIBIT — METAL SHOW CHICAGO Oct. 18-24 — BOOTH 2636

GENERAL SALES OFFICES: YORK, PA.

THE McKAY COMPANY
PITTSBURGH 22, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

when a breakdown ties up a machine

Make Fast Permanent repairs with a **"KNOCK-OUT" A. C. ARC WELDER**

Just roll your "K. O." Welder to the job—make fast, permanent repairs on the spot—save hours, even days, of valuable time.

"Knock-Out" Welders are ideal for production work too, with a wide heat range for efficient welding on sheet or heavy castings. With several models available it's easy to choose one that best fits your needs.

All "Knock-Out" Welders are built of the best materials with the most careful workmanship to give you a machine that will turn out perfect welds day after day.

Ask your "Knock-Out" dealer for details or mail the coupon today.

K. O. LEE CO.
ABERDEEN, SO. DAK.
if it's a LEE *it's a* "KNOCK-OUT"

K. O. LEE COMPANY 10
1120 First Ave. S. E., Aberdeen, S. D.
Please send us complete information on "Knock-Out" A. C. Arc Welders.

NAME_____
ADDRESS_____
CITY_____
STATE_____

National Safety Show in Chicago, Oct. 6-10

NEARLY 10,000 safety-minded people are expected to arrive in Chicago from all parts of the world to attend the 35th National Safety Congress and Exposition, beginning October 6 through 10. More than 200 sessions on all phases of safety have been planned, and four large hotels have been engaged to house the delegates and their activities.

Sessions on industrial safety will be held at the Stevens, Congress and Palmer House, while public safety sessions will take place at the Sherman hotel. Public safety displays and motion pictures will be held at the Sherman; industrial safety exhibits and films will be presented at the Stevens.

☆ ☆

Compile List of Patents on Powder Metallurgy

A COMPREHENSIVE list of powder metallurgy patents representing more than a century of progress in this art, has been compiled by Raymond E. Jager and Rolla E. Pollard of the National Bureau of Standards. The information has been gathered from a collection of 2,253 patents and classified in related groups with a short abstract for each invention.

This NBS publication, M184, United States Patents on Powder Metallurgy, is available at 30c per copy from the Superintendent of Documents, Washington 25, D. C.

☆ ☆

Weiger-Weed Becomes Division of Fansteel

ALL of the outstanding stock of Weiger-Weed Co., Detroit manufacturer of resistance-welding dies, welding fixtures and water-cooled electrode holders, has been purchased by Fansteel Metallurgical Corp., North Chicago, Ill.

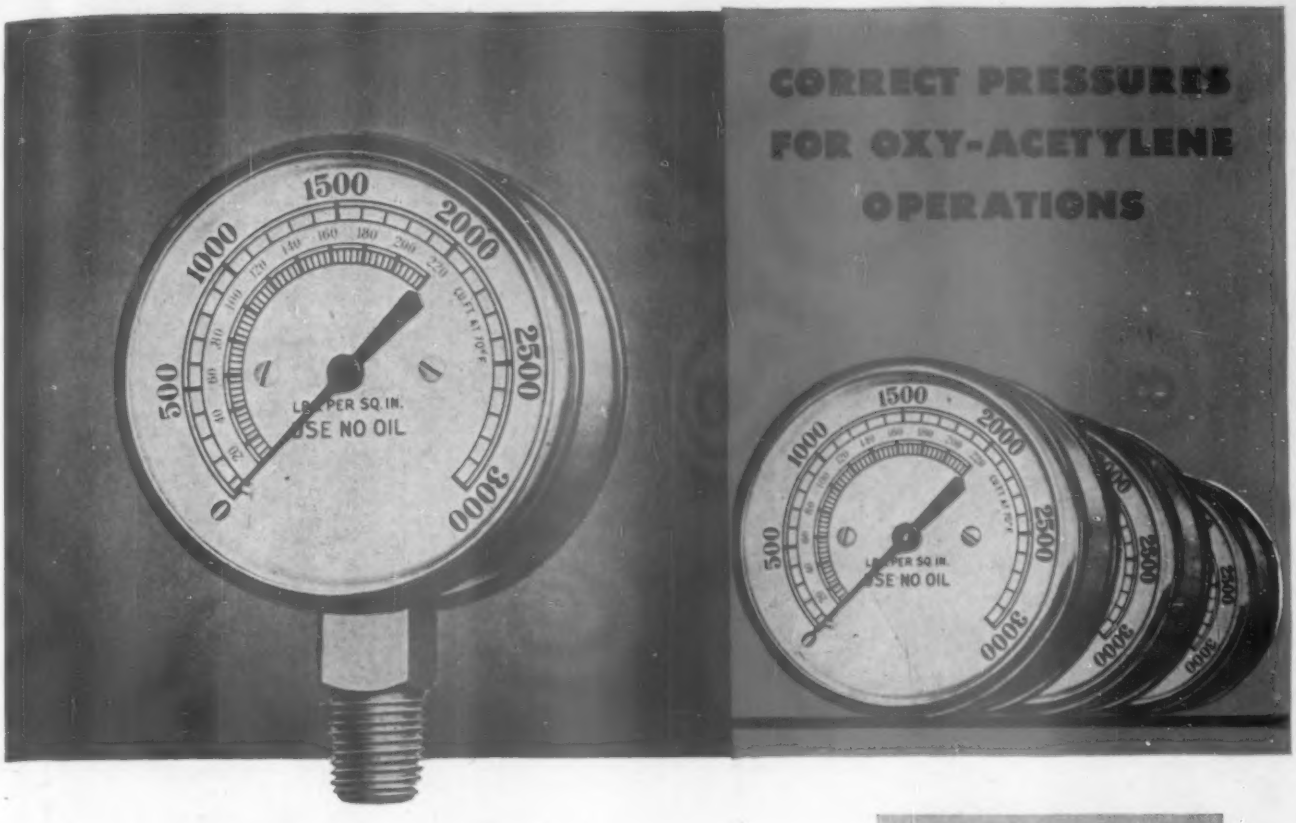
Weiger-Weed will continue operations under its own name as a division of Fansteel. Henry D. Weed will be in charge of sales, and factory production and engineering will be under the direction of Ernest Huebner. Joseph A. Weiger will be located at North Chicago as general sales manager of the parent company.

☆ ☆

Induction Heating Moves to New Home

INDUCTION HEATING CORP. has moved its offices and manufacturing facilities from 389 Lafayette St., New York City 3, to 181 Wythe Ave., Brooklyn 11. The company will occupy the entire second floor of the brick-and-concrete building, an area more than twice the size of its former plant.

New home of Induction Heating Corp., 181 Blythe Ave., Brooklyn 11



AUTO-LITE PRESSURE GAUGES

Every operator has a right to expect dependable pressure indication from the gauges on his oxy-acetylene equipment. AUTO-LITE Pressure Gauges are designed and made by an organization that pioneered in the development of dial-type precision instruments. They serve not only to safeguard the operator in his work, but to keep him working at highest efficiency. AUTO-LITE Pressure Gauges are standard equipment for oxy-acetylene apparatus, and are listed as approved by Underwriters Laboratories.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT & GAUGE DIVISION • TOLEDO 1, OHIO
NEW YORK: CHRYSLER BUILDING • CHICAGO: 600 S. MICHIGAN BLVD.

A special safety feature, exclusive with AUTO-LITE Gauges, is the grid-retainer plate at the back of the instrument. This construction gives extra protection to operator and plant equipment.

AUTO-LITE *pressure* GAUGES

TUNE IN THE AUTO-LITE RADIO SHOW STARRING DICK HAYMES—THURSDAYS, 9:00 P. M.—E. T. ON C B S

Forming-roll repairs last 25 to 30% longer —when Ampco-Trode 200 replaces other weld materials

...this rolling mill reports

A Money-saving Role in Roll Life

Experience taught this rolling mill that Ampco-Trode 200 is considerably better than other welding electrodes for applications involving heavy-duty service, wear, shock, or impact.

Here are a few qualities of this versatile aluminum bronze electrode that helped to solve the problem of excessive wear and high maintenance costs:

1. Ampco-Trode 200 provides an excellent bearing when mating against hardened steel.
2. It withstands high compressive loads without squashing out.
3. It holds up under shock loadings of high intensity without flaking.
4. It has excellent resistance to wear.
5. No chipping or grinding of previous Ampco-Trode deposit is required when making new overlays.
6. Smooth deposit eliminated need for grinding before putting rolls into service in this case.
7. Ampco-Trode 200 is easy to apply.

It pays to use Ampco-Trode 200. It has a pad weld hardness value of 212 Brinnell. It resists acids and corrosion. With SAE 1020 as a base, its ultimate tensile strength is 100,000 psi and its yield point 40,000 psi. See your nearest Ampco distributor for complete details. Write for latest Ampco-Trode literature.

AMPCO TRADE MARK REG. U. S. PAT. OFF.

W-102

Ampco-Trode 200 is a product of

Ampco Metal, Inc.

Department WE-10 • Milwaukee 4, Wis.

Ford Uses "Cannon" to Shoot Holes in Rails

RAILROAD workers who tend the 135 miles of track in the Rouge plant of the Ford Motor Co., are now equipped with a 45-lb "cannon" that is loaded like an old smooth-bore rifle. The cartridge is placed behind a punch of desired diameter, the firing pin attached and the "cannon" fired by a tap with a light hammer. The explosive force drives the punch through the steel rail, leaving a clean, perfect round hole and eliminating the time-consuming job of drilling holes in the high-carbon-steel rails.

The device is called a velocity power rail punch by its manufacturer, The Mine Safety Appliance Co. It fires a cartridge slightly larger than .45 caliber and is capable of shooting holes up to 1½ in. in diameter in ¾-in. steel plate.

☆ ☆

Find Substitute for Tin-Containing Solder

TIN-FREE solder can be used as a replacement for tin-containing solder to a limited degree, according to tests made at the Battelle Memorial Institute, Columbus, O., under a War Production Board contract. The results of these tests are described in five reports issued by the Office of Technical Services. These are:

(PB-25417) Strategic metals — elimination of tin from solder; (PB-22727 Investigation of industrial uses of tin-free and low-tin solder, part III, final report; (PB-63566) Investigation of industrial uses of tin-free and low-tin solder, part II, use of solder in the electrical industry; (PB-69119) Silver replacement for tin in solder; (PB-20509) Solders, investigation of substitutes for 70 S n/30 Pb solder used on terne plate ammunition box liners.

☆ ☆

Welding Films Popular, Says Bureau of Mines

FOUR films on brazing and the various methods of welding aluminum are included among the newly produced 16-mm educational films the Bureau of Mines is offering for free showings to schools, colleges, vocational training classes and technical and business groups. Showings of the Bureau's films have increased 20% in the past twelve months, and more new films have been acquired than in any similar period in the past six years.

All applications for the loan of Bureau films should be addressed to the main distributing center at the Central Experiment Station, 4800 Forbes St., Pittsburgh, Pa. Each borrower is required to pay transportation costs.

☆ ☆

Fram Corp. Buys Welding Rod Plant

FRAM CORP., East Providence, R. I., recently purchased from the War Assets Administration a welding rod plant located in Pittsburg, Calif., and will convert it to the manufacture of oil filters. The plant, sold for $116,118, was formerly operated by the Acrods Corp. Machinery and equipment are not included in the authorized sale and are to be removed for disposition by the WAA general disposal division.

Here is the low-cost, motor-driven gas cutting machine you are looking for—the Airco No. 10 Radiagraph.

This machine cuts straight lines of any desired length in steel plate . . . arcs up to 42½ inch radius . . . and circles from 3 to 85 inches in diameter. Further it will prepare edges for welding with a straight butt edge, "V" groove, single or double "U" groove, single or double "J" groove, or double bevel groove without land . . . and it operates at speeds from 4 inches to 50 inches per minute.

Weighing only 41 pounds net, the No. 10 Radiagraph can be easily moved from job to job. To facilitate carrying, the machine has a hand grip on one end.

With this compact, nominally priced machine all shops engaged in preparing steel for welded fabrication can now enjoy the speed and economy of machine gas cutting.

For a copy of a booklet containing full details about the Airco No. 10 Radiagraph, write for ADC-614C. Address your nearest Airco office or Dept. **WE** —5867, Air Reduction, General Offices, 60 E. 42nd St., New York 17, N. Y.; in Texas: Magnolia Airco Gas Products Co., General Offices, Houston 1, Texas. Represented Internationally by Airco Export Corporation.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for oxygen, acetylene and other gases . . . carbide . . . gas welding and cutting apparatus and supplies . . . arc welders, electrodes and accessories

low cost PORTABLE GAS CUTTING MACHINE

cuts steel faster . . . more economically

Airco No. 10 Radiagraph set-up for cutting inside and outside circles.

This shows the No. 10 Radiagraph simultaneously cutting two straight lines with 45° beveled edges.

"THAT'S FOR ME!!!"

That's just exactly what the man said.

You've probably said it, too—as you leafed through the advertising pages of a current issue of THIS magazine.

It happens all the time—to every man who is on top of his job.

Why? Because he keeps a weather eye out for the things that promise a better, faster, more economical way of doing something.

He knows that America's leading manufacturers take the newest and best of their products and services to market in the advertising pages of the business and industrial magazines that help him keep on top of his job. And if *it's for him* he wants to know what makes it tick.

To keep in touch with the parade------

READ THE ADS.

Independent Oxygen Group Plans Merchandising Program

INDEPENDENT OXYGEN MANUFACTURERS' ASSOCIATION has appointed a Merchandising Committee for the purpose of handling a coördinated merchandising program. One of the functions of this committee will be to bring to the attention of the association's members new products that come into the welding industry. The Committee invites developers of new products to write to its chairman, Joseph Wagner, at 3300 Lakeside Ave., Cleveland 14.

The association recently elected the following new officers: I. F. Fausek, Acetylene Gas Co., president, Harrison Bird, Bird Gas Corp., vice-president, J. F. Wagner, The Burdett Oxygen Co., Cleveland, secretary, and R. G. Smith, Stuart Oxygen Co., San Francisco, treasurer.

☆ ☆

Use New Film for Welding Pictures

NATIONAL CYLINDER GAS COMPANY'S "Torchweld" line of welding and cutting equipment has been photographed in actual use on a sound-slide film by Chicago Film Laboratory, Inc., using the Eastman Kodak Company's new "Ektachrome" color film. Brilliance of the welding flame, molten metal and highly polished surfaces of the equipment combine to make pictures of unusual beauty, say previous audiences. The biggest advantage of the new color film, however, is the fact that the photographer can process his own negatives.

The new sound film is currently being shown to distributors and large users through the company's 53 sales offices.

☆ ☆

New Oxygen Firm in Seattle, Wash.

WESTERN OXYGEN, INC., Seattle, Wash., recently began to manufacture oxygen for users in the Pacific Northwest. The new firm, incorporated for $200,000, is headed by Morgan McBride, formerly manager of Air Reduction Sales Company's Seattle operations, as president and E. R. Hodson, with Air Reduction for 16 years at Portland, Ore., as vice-president. Earl Doran is secretary-treasurer. Acetylene production is scheduled for later this year.

☆ ☆

Buys California Electrode Plant

HICKENBOTHAM BROS., LTD., Stockton, Calif., has purchased from the War Assets Administration a surplus government plant located in this city. The property consists of a one-acre site, a single-story manufacturing building containing 25,000 sq ft of floor space and essential production equipment. The plant, purchased for $57,500, will be used for the production of welding electrodes and will employ about 35 workers.

☆ ☆

Airco Opens Ohio Acetylene Plant

IN order to meet the increased demand for acetylene in Dayton, O., and surrounding areas, Air Reduction Sales Co. has opened a new acetylene plant in this city. Plant superintendent is R. K. Haygood, who has been with the company for over ten years.

Conversion Table—Inches to Millimeters

Inches		0	1	2	3	4	5	6	7	8	9	10	11	12
		mm.	25.400	50.800	76.200	101.600	127.000	152.400	177.800	203.200	228.600	254.000	279.400	304.800
1/64	.015625	0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597	228.997	254.397	279.797	305.197
1/32	.03125	0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994	229.394	254.794	280.194	305.594
1/16	.0625	1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788	230.188	255.588	280.988	306.388
3/32	.09375	2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581	230.981	256.381	281.781	307.181
1/8	.125	3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375	231.775	257.175	282.575	307.975
5/32	.15625	3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169	232.569	257.969	283.369	308.769
3/16	.1875	4.763	30.163	55.563	80.963	106.363	131.763	157.163	182.563	207.963	233.363	258.763	284.163	309.563
7/32	.21875	5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756	234.156	259.556	284.956	310.356
1/4	.25	6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550	234.950	260.350	285.750	311.150
9/32	.28125	7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344	235.744	261.144	286.544	311.944
5/16	.3125	7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138	236.538	261.938	287.338	312.738
11/32	.34375	8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931	237.331	262.731	288.131	313.531
3/8	.375	9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725	238.125	263.525	288.925	314.325
13/32	.40625	10.319	35.719	61.119	86.519	111.919	137.319	162.719	188.119	213.519	238.919	264.319	289.719	315.119
7/16	.4375	11.113	36.513	61.913	87.313	112.713	138.113	163.513	188.913	214.313	239.713	265.113	290.513	315.913
15/32	.46875	11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106	240.506	265.906	291.306	316.706
1/2	.50	12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900	241.300	266.700	292.100	317.500
17/32	.53125	13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694	242.094	267.494	292.894	318.294
9/16	.5625	14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488	242.888	268.288	293.688	319.088
19/32	.59375	15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281	243.681	269.081	294.481	319.881
5/8	.625	15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075	244.475	269.875	295.275	320.675
21/32	.65625	16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869	245.269	270.669	296.069	321.469
11/16	.6875	17.463	42.863	68.263	93.663	119.063	144.463	169.863	195.263	220.663	246.063	271.463	296.863	322.263
23/32	.71875	18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456	246.856	272.256	297.656	323.056
3/4	.75	19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250	247.650	273.050	298.450	323.850
25/32	.78125	19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044	248.444	273.844	299.244	324.644
13/16	.8125	20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838	249.238	274.638	300.038	325.438
27/32	.84375	21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631	250.031	275.431	300.831	326.231
7/8	.875	22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425	250.825	276.225	301.625	327.025
29/32	.90625	23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219	251.619	277.019	302.419	327.819
15/16	.9375	23.813	49.213	74.613	100.013	125.413	150.813	176.213	201.613	227.013	252.413	277.813	303.213	328.613
31/32	.96875	24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806	253.206	278.606	304.006	329.406

Introducing Multi-Pic

the NEW WELD CLEANING TOOL

NEW PRINCIPLE—GREATER EFFICIENCY—Five separate hammer heads—each free to move ⅜"—are mounted on a single hammer handle. When a blow is struck, each of these free-floating heads strikes with equal impact at five different points, ***regardless of surface contour.***

The Multi-Pic actually wraps the force of the blow around a convex weld bead . . . follows the contour of a concave fillet weld and searches out the hard-to-reach crevices of deep groove multi-pass weld beads.

CONSTRUCTION FEATURES—Head segments of tool steel . . . Handle shank of ⅜" hard drawn mild steel . . . Both shank and head segments plated with cadmium to retard rusting—resists fusion of weld splatter . . . extra long, non-turning hickory handle assures perfect balance and insulation against shock. TWO MODELS—MP-1, as illustrated, and MP-2, similar in every detail except that one end of the head assembly consists of 25 pick points, five on each of the five floating segments, covering an area ⅝" x ⅝".

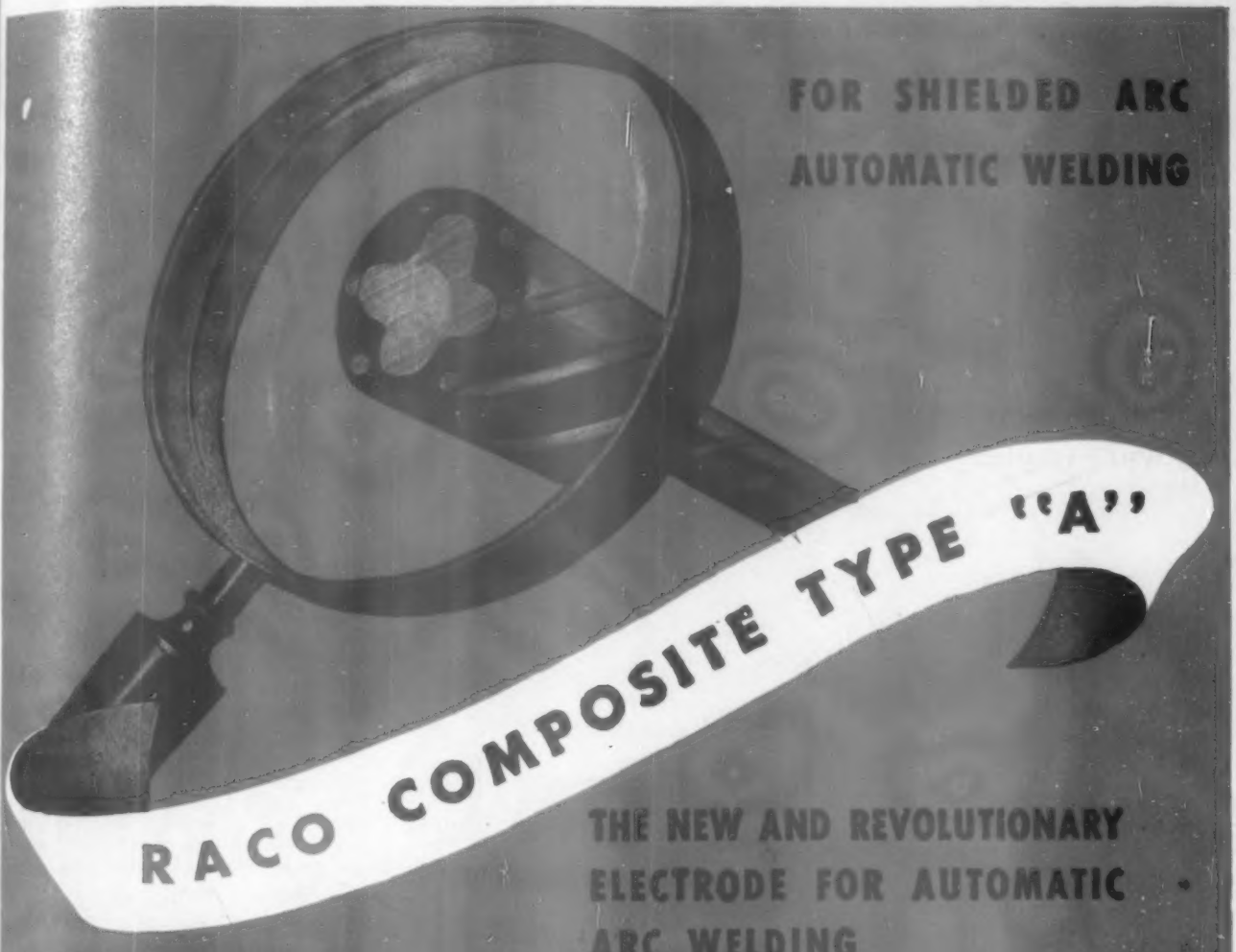
DEALERSHIPS AVAILABLE!

Write for descriptive folder and sales plan

BERNARD

WELDING EQUIPMENT CO.

741-43 East 71st Street • Chicago 19, Illinois



FOR SHIELDED ARC AUTOMATIC WELDING

RACO COMPOSITE TYPE "A"

THE NEW AND REVOLUTIONARY ELECTRODE FOR AUTOMATIC ARC WELDING

RACO Composite Type A is a heavily coated electrode in coils, providing the same physical results as heavily coated manual electrodes. With RACO Composite Type A, extremely high speeds can be obtained in any position.

It can be used with all standard automatic arc welding heads without alterations or additions.

RACO Composite Type A can be had with any of the following coatings—A.W.S. 6012; 6020; 6030 and corresponding high tensile grades. This electrode can also be furnished in three grades of hard surfacing material for building-up—RACO 25 (20-25 Rockwell C), RACO 45 (40-50 Rockwell C) and RACO 55 (50-60 Rockwell C). RACO Composite Type A Electrode is furnished in the following sizes: No. 6 (approx. 1/4"), No. 5 (approx. 7/32"), No. 4 (approx. 3/16"), and No. 3 (approx. 5/32"). Coils are 36 inches I.D., and weigh 150 to 200 pounds net.

LIGHTLY COATED AUTOMATIC ELECTRODES:—

RACO Types "D", "M", M-9 (Knurled), Plain Mill Finish and Copper Coated Wire in coils.

We draw a full line of copper coated oxy-acetylene welding wires. Furnished in coils and straightened and cut lengths.

We further manufacture a complete line of heavy coated manual electrodes for welding:—Mild Steel—High Tensile Steels—Stainless Steel—Manganese Steel—Cast Iron—Nickel—Monel—Inconel and Aluminized Steel.

The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND

SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

TRY IT IN YOUR SHOP . . .
ON YOUR JOBS

KERN'S
NEW A-C WELDER

ARC PERFORMANCE
IS WHAT YOU BUY!

With a KERN WELDER
You Get an ARC that is—

- Instant Starting
- Smooth
- Soft
- Stable

HERE'S WHY —

Advanced magnetic circuit incorporates **two** primary and **two** secondary coils in a compact design that utilizes more copper — assuring higher efficiency, longer life and maximum arc performance.

KERN WELDER design is compact, as the need for reactor coils and arc boosters is eliminated—yet its arc performance is superior to that of heavy, unwieldy welders.

In a KERN WELDER, the core moves, ***not the coils.*** This feature contributes to higher efficiency and permits faster, more accurate change of amperage.

SEE THE NEW KERN WELDER IN OPERATION AT THE METAL SHOW— BOOTH NO. 2923

5 Models to Choose from:

130 Amps
180 Amps
200 Amps
300 Amps
400 Amps

Get the Proof in Your Own Shop . . .

ASK FOR A DEMONSTRATION—*TODAY!*

D I S T R I B U T O R S
Write today for sales plan concerning distribution in your area.

JOHN A. KERN CO. 224 N. LOOMIS ST. CHICAGO 7, ILLINOIS

About People

PERRY MENDENHALL, who at 31 is known as the "world's oldest Heliarc welder," has left Northrop Aircraft, Inc., Calif., to open his own welding shop. Mr. Mendenhall won distinction in Heliarc welding through his assistance in the pioneer of development of this welding process at Northrop. His new shop will be located on Pacific Ave. in San Pedro, Calif.

☆ ☆

HARRY W. KNOLL has been elected president of H. B. Rouse and Co., Chicago, whose machine tool division produces hand milling machines and fixtures for the metal working fields.

☆ ☆

WILLIAM R. HOLMES has been promoted assistant district manager of U. S. Steel Supply Company's warehouse in Newark, N. J.

☆ ☆

L. R. GARRETSON has retired as advertising manager of Leeds & Northrup Co. after 25 years of service. KENNETH W. CONNERS succeeds Mr. Garretson in this position. OSCAR BREWER, sales engineer for the company and for several years Philadelphia division sales manager, has also retired after nearly 39 years with the organization.

☆ ☆

Six new assistant directors have been named to the staff of Battelle Memorial Intitute, Columbus, O. They are: Ralph A. Sherman, Clarence E. Sims, John D. Sullivan, DOCTORS FRANK C. CROXTON, CLARENCE H. LORIG and HOWARD W. RUSSELL, all veterans of this industrial research institution.

☆ ☆

O. S. WILLIAMSON and V. E. BERTRAMSON have been appointed sales representative for Titan Metal Mfg. Co., Bellefonte, Pa. Their territory includes Minnesota and North Dakota, with headquarters at 515 Andrus Building, Minneapolis.

☆ ☆

JOHN K. NORTHROP, president of Northrop Aircraft, Inc., has been awarded the Spirit of St. Louis Medal, the highest aviation honor of the American Society of Mechanical Engineers, for his development of the "Flying Wing" and other coatributions to aeronautical science.

☆ ☆

C. E. SMITH, chief electrical engineer, and J. J. Riley, sales engineer of Taylor-Winfield, have been awarded a first prize and certificates of award for their joint paper, "Influence of Magnetic Materials on the Welding Characteristics of Resistance—Welding Machines." The award was made by the permanent reference volume "Transactions," published by the American Institute of Electrical Engineers.

☆ ☆

DR. FORD R. LOWDERMILK has been appointed supervisor of the development division in the research and development department of Pennsylvania Salt Mfg. Co.

SIL-FOS EASY-FLO

STARS OF AN *Amazing* INDUSTRY-WIDE "METAL JOINING SHOW"

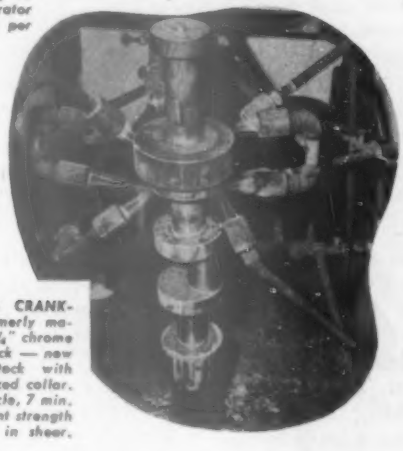
If the hundreds of products now made with the low-temperature silver brazing alloys, EASY-FLO and SIL-FOS were assembled in one place, you would see a truly amazing display — amazing in its range and variety — but most amazing in the *extent to which EASY-FLO and SIL-FOS brazing boosted production and slashed costs* in practically every case.

What's more, you would find nothing sacrificed in getting these results. On the contrary, product improvement is the rule — first, because EASY-FLO and SIL-FOS brazing makes assemblies that *equal or exceed the solid metal in strength, leak-tightness and all other essential properties* — and secondly, because EASY-FLO and SIL-FOS brazing *permits streamlined designs which can be produced with big-scale savings in man-hours, machine-hours and metals.*

INVESTIGATE this *proven* way to raise production and cut costs. Find out where and how it fits into your production. We'll be glad to send a field engineer to help you get the answer. Send for *BULLETINS 12-A and 15.* They'll give you full EASY-FLO and SIL-FOS facts. Write for them today.

***UNIVERSAL JOINT** — forged yoke EASY-FLO brazed to steel sleeve with induction heating — One operator does 655 per 8 hours — Every joint gets a 1540 lb.-ft. torque test.*

***OIL FILTERS** — EASY-FLO fabricated in 3 steps — bronze bushing to steel head — head to steel shell — steel ring to shell — Each operator averages 110 units per 8 hours.*



***PUNCH PRESS CRANKSHAFT** — Formerly machined from 5¾" chrome nickel steel stock — now from 4½" stock with EASY-FLO brazed collar. Gas brazing cycle, 7 min. 35 secs. — Joint strength rated 92 tons in shear.*

AT THE CHICAGO METAL SHOW BOOTH 150 See our live exhibit including a production brazing job in action, torch brazing demonstrations, examples of work from many industries and "before" and "after" brazing case histories. Experienced engineers will be in attendance to discuss metal joining problems with you.

HANDY & HARMAN

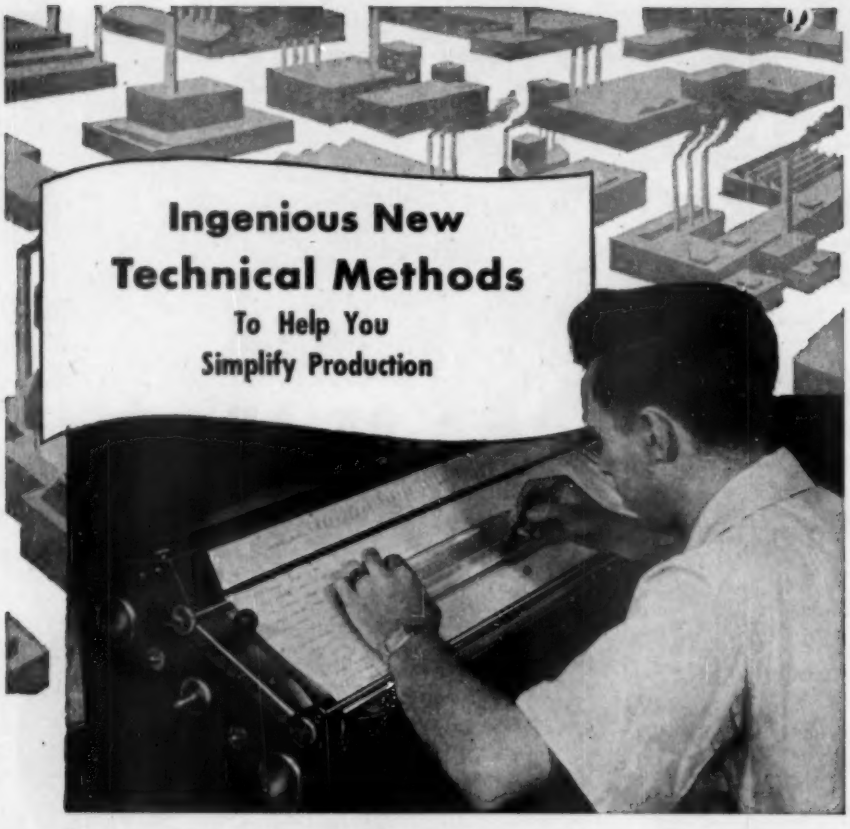
82 FULTON STREET NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada

Agents in Principal Cities

A FEW OF TODAY'S EASY-FLO AND SIL-FOS BRAZED PRODUCTS

Aircraft	Bus Bars	Gasoline Lamps	Lighting Fixtures	Meters	Refrigerators	Stampings	Tractors
Aircraft Accessories	Electrical Appliances	Gasoline Stoves	Locomotives	Paper Cup Holders	Refrigeration Equipment	Switchboards	Transformers
Automobiles	Electrical Connections	Heating Equipment	Machinery	Pipe and Tubing	Refrigeration Piping	Switch Boxes	Universal Joints
Automobile Accessories	Electrical Contacts	Instruments	Marine Equipment	Pots and Pans	Ships Piping	Tool Repairs	Washing Machines
Bicycles	Electrical Equipment	Lawn Mowers	Metal Furniture	Radios	Spark Plugs	Tool Tipping	



New Automatic Device Provides Up-to-the-Minute Visual Record

The new CHART-O-MATIC provides an instant visual record of all production, shipments, purchases, absenteeism, etc. Avoids inventory surpluses. Guides purchasing department giving constant picture of all parts and supplies on hand. Requisitions can be made direct from chart. Information from all departments transmitted to operator by Telautograph permits instant recording on CHART-O-MATIC. Does away with big wall charts and card-systems and tedious, time-consuming search for data that is often far from current. With the CHART-O-MATIC, the complete activities of the entire plant can be determined in an instant.

The New Chart-O-Matic

The entire unit is easily portable and operates from 110 volts current. Chart rotates in either direction by finger-tip control. Speed may be governed by rheostat.

New devices are proving their worth in saving time and reducing nervous tension on the job. And modern plants throughout America are finding that chewing gum on the job helps relieve monotony and helps to keep workers alert. That is why more plants every day are making Wrigley's Spearmint Gum available to their employees.

Complete details may be obtained from Spiral Mfg. Corporation, 3612 N. Kilbourn Avenue, Chicago 41, Illinois.

AB-76

ARTHUR A. BERNARD, who has spent more than a quarter of a century in the development and practical application of welding processes, equipment and accessories, has set up his own development laboratory and manufacturing plant, The Bernard Welding Equipment Co., at 741-43 East 71st Street, Chicago.

First product to be designed by Bernard for the new company is the "Multi-Pic," a weld-cleaning hammer which is claimed to give cleaner welds and faster cleaning time (see page 94).

☆ ☆

GEORGE PAUL BURKS has been promoted superintendent of Carnegie-Illinois Steel Corporation's furnace division at the Gary works. He succeeds Walter Scott MacNabb, retired.

☆ ☆

L. B. BUCKLER has been named general manager of Adams Portable Spot Welder Co.

☆ ☆

BOYD V. GIESEY has been named head of all sales for Progressive Welder Co., in the state of Michigan north of Detroit. He was formerly in charge of the company's flash welder division. Mr. Giesey is located at 320 S. Larch St., Lansing, Mich. He will be assisted by ROBERT O. WIGHT, formerly welding applications engineer for Progressive.

☆ ☆

WILLIAM C. KRECKLOW has been named production control manager of the West Allis general machinery works of Allis-Chalmers Mfg. Co. He succeeds HAROLD A. WALLACE, who has resigned. ARTHUR A. RYAN succeeds Mr. Krecklow as superintendent of the electrical manufacturing division.

☆ ☆

F. A. MCCARTHY, vice-president and sales manager of Forem Distributors, Inc., Buffalo, has been appointed by North American Philips Co., Inc., as a dealer for its industrial research apparatus. Mr. McCarthy's territory includes 14 counties in western New York and seven counties in northwestern Pennsylvania.

☆ ☆

CLYDE DUNN formerly owner of a garage shop in Cashmere, Wash., has opened a welding works at Leavenworth, Wash., doing both arc and acetylene welding.

☆ ☆

MARSHALL E. NEIL has been appointed general sales manager for Mid-States Equipment Corp., Chicago. He will direct the company's distribution program of "Metal Zipper" a-c welders in all domestic and foreign markets.

☆ ☆

FRANK J. SHANABERG has been named eastern district sales manager for the American Welding & Manufacturing Co., Warren, O. This territory includes the bulk of New England, Washington, D. C., eastern New York and Pennsylvania.

☆ ☆

HAROLD S. FALK, president of the Falk Corp., has been elected a member of the board of directors of Allis-Chalmers Mfg. Co.

☆ ☆

MALCOLM W. REED has been appointed engineering vice-president of Carnegie-Illinois Steel Corp.

Announcing the New P&H AC ARC WELDER with Dial-lectric Control

Not Merely a New Model — But a Complete New Design

Here is the world's most advanced AC arc welder. A design so different, it eliminates all moving coils or cores — worm gears, sprockets and chain or lever adjustments. Nothing to get out of order, nothing to wear. There isn't a single moving part that can bind or "freeze" from rust.

Exclusive P&H "Dial-lectric" control provides instant, accurate, *finger-tip* current selection. Only a three-quarter turn is required for continuous heat control from minimum to maximum capacity.

If you are now welding with AC — or plan to, you should investigate this really new machine . . . both designed and built by P&H for simpler, stronger, lower-cost welding.

DELIVERIES

now being made. See your P&H Distributor, or write for Bulletin W-72.

FEATURES

- Not a single moving part
- Easier, more accurate, creep-proof "Dial-lectric" control
- No plug-ins — no cranks
- Instantaneous arc without auxiliary current boosters
- High-low welding range for general purpose or light gauge welding
- Extremely long service life
- Sturdily-built, smartly designed
- Wheel mounted for easy moving
- Removable dial for remote control
- N.E.M.A. rated

P&H

ARC WELDERS

4513 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES | P&H | MOTORS • HOISTS • WELDING ELECTRODES

ANNOUNCING!

Eureka 100% PURE NICKEL WELDING ELECTRODES

PRODUCE MACHINABLE WELDS ON CAST IRON WITH 100% PURE NICKEL DEPOSITS

1 Have *insulating coatings*, preventing side-arcing.

2 Smooth spatter-free arc action, AC-DC.

3 Emit no injurious gases.

4 Produce smooth bead contours with excellent slag coverage.

5 Give soft, ductile, homogeneous and porous-free weld deposits.

You Be the Judge
ORDER A 5-LB. PACKAGE *Today!*

Welding Equipment & Supply Co.

MEMBER AMERICAN SOCIETY OF TOOL ENGINEERS

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

225 Leib Street • Detroit 7, Michigan

HELPFUL LITERATURE

FREE Gives properties and recommended procedures for application of heat-resisting alloy electrodes, pure nickel electrodes, copper-nickel alloy electrodes, bronze electrodes, copper electrodes, cast iron electrodes and "Drawalloy" electrodes.

Welding Equipment & Supply Co.
223 Leib Street,
Detroit 7, Michigan

Rush me Bulletin explaining use of Eureka Alloy Electrodes.

Name_____
Address_____
Title_____
City_____ State_____

SELBY F. GREER has been appointed general sales manager for the Kellogg division of American Brake Shoe Co. He will be located at the main plant in Rochester.

☆ ☆

HENRY P. REID has been appointed chief engineer of the Universal Atlas Cement Co.

☆ ☆

ROLAND E. NELSON has been appointed manager of the Chicago office of the H. K. Porter Co., Inc.

☆ ☆

CLARENCE W. COE has been appointed manager of the new Decatur, Ill., works of the General Electric Plastic's division.

☆ ☆

BENNETT S. CHAPPLE, JR., has been appointed assistant sales vice-president, U. S. Steel Corp.

☆ ☆

LOUIS J. ROHL has been promoted assistant chief metallurgical engineer for Carnegie-Illinois Steel Corp., Pittsburgh.

☆ ☆

CLEVELAND NORCROSS has been appointed assistant director of the American Institute of Physics.

☆ ☆

CHARLES H. SCHNIGLAU has retired as assistant traffic manager, Chicago district, U. S. Steel Corp. He is succeeded by H. W. HUEBNER.

☆ ☆

COL. LESLIE S. FLETCHER has been appointed technical director for Sam Tour & Co., Inc., and its affiliate, American Standards Testing Bureau, Inc., both of New York City.

☆ ☆

H. D. WORTHINGTON has been appointed supervisor, construction material sales, Chicago district, American Steel & Wire Co.

☆ ☆

HAROLD L. HOEFMAN has been elected vice-president in charge of manufacturing for Link-Belt Co., Chicago. DAVID E. DAVIDSON succeeds Mr. Hoefman as general manager of the company's Pershing Road plant, Chicago.

☆ ☆

ROBERT O. BULLARD has been appointed manager of the metallurgy division of General Electric's chemical department.

Died . . .

HARRY N. SYSTER, supervisor of mill sales for Latrobe Electric Steel Co., Latrobe, Pa., died July 21, at Latrobe. Mr. Syster was associated with the company for over 30 years.

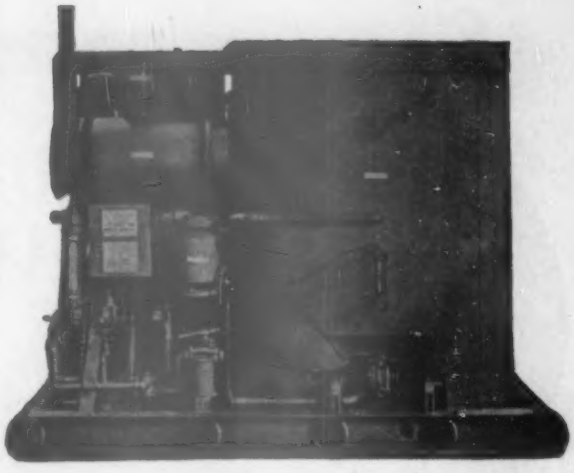
☆ ☆

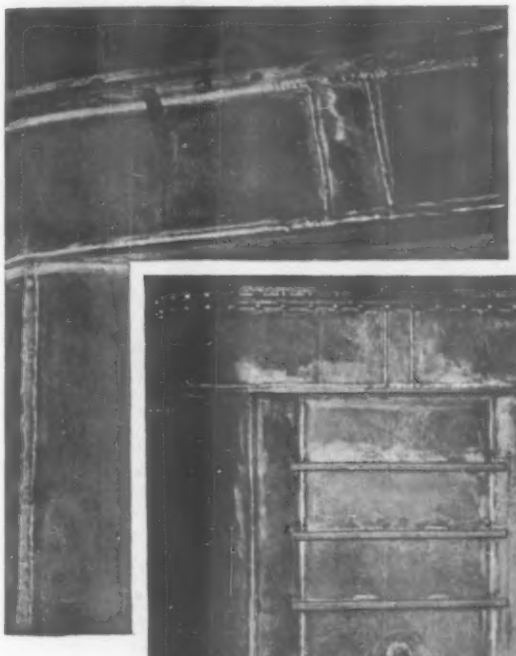
J. PAUL ARENS, works manager for Ceco Steel Products Corp., Chicago, died at his home, in Oak Park, Ill., July 29. Mr. Arens was well known in the steel products field, having been associated with the Truscon Steel Co. for many years before joining Ceco.

☆ ☆

FREDERIC W. WILLARD, retired president of the Nassau Smelting and Refining Co., Inc., Western Electric subsidiary, died August 11, at his home in Summit, N. J. Mr. Willard was a metallurgist and chemical engineer of national prominence and served more than 40 years in the Bell System.

ANOTHER INSTANCE OF CARBON ARC WELDING with Chase Olympic Bronze





WHEN it's a case of welding copper or the copper alloys, it has proved, time and again, to be a job for the carbon arc and Chase Welding Rods.

Here's a typical instance. The water distillation unit illustrated—designed to convert ocean brine and other impure waters into pure drinking water at the rate of 6000 gallons in 20 hours—uses Olympic Bronze heads on heat exchanger, evaporator and flash tank. The heads are carbon arc welded—with Chase Olympic Bronze Rods.

The carbon arc method saves man-hours and materials, cuts construction costs. Chase engineers have made the method adaptable to copper-to-copper construction—extending the advantages already proved in the welding of the copper alloys.

If you are not already using this new welding technique, write, on company letterhead, for handbook, "Chase Welding Rods—and Welding of Brass, Copper, Bronze."

HERE YOU SEE the evaporator of distillation unit carbon arc welded together with close-up of the weld. Evaporator is formed of Chase Olympic Bronze sheet; Chase Olympic Bronze Welding Rods are used in construction. Total weight of brass, bronze and copper required for complete unit—7000 lbs.

THIS BOOK CAN HELP YOU make fine quality welds. It shows the advance made in the art of welding copper and copper alloys by the carbon arc method. For a complimentary copy, address Dept. WE 107.

Chase

the Nation's Headquarters for
BRASS & COPPER

WATERBURY 91, CONNECTICUT

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

THIS IS THE CHASE NETWORK — *handiest way to buy brass*

ALBANY† ATLANTA† BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS† NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE† ST. LOUIS WASHINGTON† †Headquarters Sales Office Only

Victor

WELDING CABLE

FOR YOUR CABLE REQUIREMENTS

Thousands of hair-fine copper strands, to provide utmost flexibility and maximum conductivity, and a tough vulcanized live-rubber jacket make VICTOR Extra-flexible Welding Cable the leader wherever long life, ease of handling and economy are essential. . .

Remember! . . . Your men and machines are no better than the cable you use.

Available immediately in sizes from #6 to 4/0.

Victor

POWER CABLE

Single and multi-conductor Extra-flexible power lead cable available in all sizes.

DISTRIBUTORS • WRITE FOR DETAILS

Victor

ELECTRIC WIRE AND CABLE CORP.

130 LAFAYETTE STREET

New York 13, N. Y. **Tel. CAnal 6-5853**

FOR BEST WELDING RESULTS USE VICTOR CABLE

New Products to Use

Weld-Cleaning Hammer

THE "Multi-Pic" hammer works on an entirely new principle. Five separate pick-pointed hammer heads—each free to slide ⅜-in.—are mounted on the hammer handle. When a blow is struck, each of the

This new hammer has five separate picks. Lower sketches show head segments (left to right): wrapping around a convex bead; following the contour of a concave fillet and attacking the crevice of a deep-groove weld

five head segments strikes with equal impact at five different points, regardless of surface contour. These free-sliding head segments, states manufacturer, wrap the force of the blow around a convex weld bead or follow the contour of a concave weld fillet or deep crevice, as shown in the sketches.

The head segments are of tool steel, hardened and tempered throughout. They can be resharpened on a grinding wheel in the same manner as an ordinary chisel. The shank is of ⅜-in. hard-drawn mild steel. Both head segments and shank are plated with cadmium, which retards rusting and also keeps weld splatter from fusing to the metal parts. The long hickory handle is fitted with a lock pin to prevent it from turning.

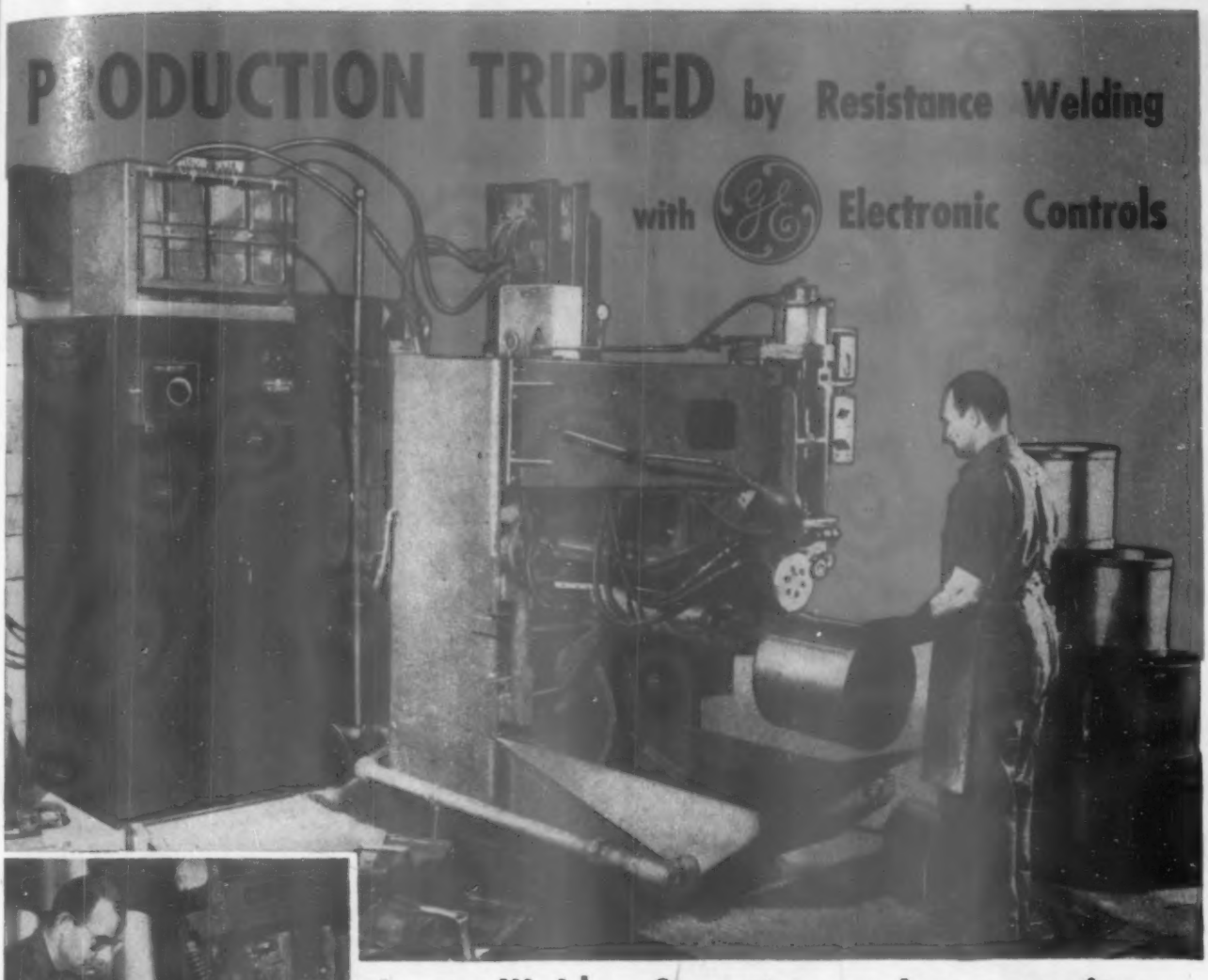
The "Multi-Pic" and other products to follow are being offered to leading distributors of welding equipment in each area. THE BERNARD WELDING EQUIPMENT CO., 741-43 East 71st St., Chicago.

☆ ☆

Silicon-Copper Rod

AIRCO No. 23A, a silicon-copper welding rod, has application wherever welding is to be done on copper. It is said to provide stronger welds, equal in quality to those given by silver-copper rods. Available in ¼, 3/16 and ⅛ in. diameters. AIR REDUCTION SALES CO., 60 East 42nd St., New York City 17.

PRODUCTION TRIPLED by Resistance Welding with G-E Electronic Controls



By shifting from acetylene welding to resistance welding with G-E controls, Tarrant Manufacturing Co., Saratoga Springs, N. Y., has tripled their production of road maintenance equipment.

Actual increase in production rate is even greater. It took three minutes to acetylene weld the bottom seam of the roofer's bucket pictured above; now, it takes 20 seconds. G-E controls assure automatic and accurate timing of the welding cycle; thus, faster, more consistent welding.

Large Welder Operates on Low-capacity Power Lines . . . Thanks to Series Capacitors

No Large Voltage Drop . . . Unity Power Factor

This large welder operates on low-capacity power lines, with no large voltage drop, thanks to G-E series capacitors. They reduce the normal welder demand from 100 kva to 40 kva, and correct the power factor to unity. There is no light flicker in the plant or surrounding residential area. For details on series capacitors, ask for Bulletin, GET-1134.

New Lines of Synchronous and Nonsynchronous Controls

1. Control is factory-assembled in one, easy-to-install cabinet.
2. Easy servicing through large side door of cabinet.
3. Control station always faces operator.

For further details, ask for Bulletins GEA-4699 and GEA-4726.

HAVE YOU SEEN

"This Is Resistance Welding", G.E.'s 30-minute, full-color movie? Your nearest G-E office, local utility, or resistance welder manufacturer representative will be glad to arrange a free showing.

GENERAL ELECTRIC

Apparatus Department, Sec. G645-43
General Electric Company
Schenectady 5, New York

Please send me the following bulletins:

- ☐ GEA-4699, Synchronous Precision Control for Spot and Projection Welding
- ☐ GEA-4726, Nonsynchronous Control for Spot and Projection Welding
- ☐ GEA-4571, The Importance of Control
- ☐ GET-1134, Application of Series Capacitors to Resistance Welding Machines

Name.....

Company.....

Address.....

P&H WELDING POSITIONER

Position the Work Not the Operator

Cut Welding Costs 50%

By quick, simple positioning of work for down-hand welding — P&H Positioners spare operators from awkward, uncomfortable positions . . . put an end to slow, costly out-of-position welding . . . permit the use of larger electrodes for faster deposition. They cut costs 50% for many users.

Actual comparison of positioned vs. unpositioned welding proves savings. Write for bulletin P2-1 of facts, figures and photos.

FEATURES OF WP-2 POSITIONER

- 2500 lbs. capacity
- Hydraulic power tilting
- 360° table rotation
- 135° table tilting
- Positive table locking device
- Telescopic elevation
- Manual turning to suit welding speeds
- Large table area with handy slots
- Portable or column-in-floor mounting

P&H WELDING POSITIONER
4513 W. National Ave.,
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

A Complete Line of Cylinders for ALL GASES

INDEPENDENT cylinders take from 5 to 10% more gas. Uniformity of monolithic filler insures even distribution of acetone. Acetylene cylinders available in 10, 40, 100, 150, 250 and 285 cu. ft. sizes. Oxygen cylinders in all sizes. Also storage cylinders, in 12 and 20' lengths of 850 and 1500 cu. ft. capacities.

Write for quotations on *any* size for *all* gases.

Low Pressure ACETYLENE GAS PRODUCING PLANTS

This 600 pound Acetylene Generator Plant (generator only shown) is one of the safest manufactured. Its automatic controls minimize operating personnel. Affiliate units are designed to insure maximum production at minimum cost. Capacity 2700 cu. ft. per hour. Details of construction and layout gladly furnished.

We invite your inquiries on oxygen producing plants of all sizes.

INDEPENDENT ENGINEERING COMPANY, Inc.
Manufacturers of
CONSULTING · RESEARCH · DESIGNING
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
O'FALLON, ILLINOIS

Electrode for Rails

IMPROVED track maintenance is made possible with "Railface," a welding electrode for high-carbon railroad rails. Welds produced are said to be homogeneous

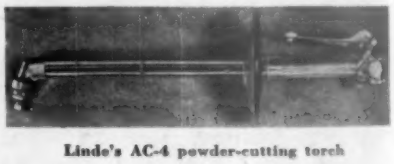
"Railface" electrodes for maintenance of high-carbon railroad rails

with the rail and, when properly applied, free from porosity or cracks. Correct procedure results in a Brinell hardness of about 325 with an ultimate work hardening to 380 Brinell.

Weld preparation requires grinding out the spalled or battered ends and preheating. The welding sequence is started at a point near the rail end on the outside of the ball, proceeding around the rail end, down the gauge side to the limit of the proposed weld and returning diagonally to the beginning. After post-heating, the rail ends are ground to conform to the balance of the section.

"Railface" is available, coated-only, for a-c/d-c welding in 3/16-in. or ¼-in. diameters. Recommended setting for the 3/16-in. electrode is 175 to 200 amp and for the ¼-in. electrode is 225 to 275 amp. These current values are intended to mean approximate amperage at the point of work, and sufficient allowance must be made for power drop between the power supply and work. AMERICAN MANGANESE STEEL DIV. of AMERICAN BRAKE SHOE CO., Chicago Heights, Ill.

☆ ☆



Linde's AC-4 powder-cutting torch

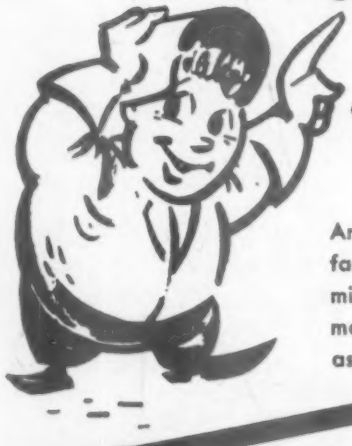
Powder-Cutting Torch

RECOMMENDED for cutting stainless steels, chrome alloys and cast iron up to 9 in. thick, the new Oxweld AC-4 hand-operated powder-cutting torch has a third hose which conducts the powder from the dispenser by means of compressed air. The iron-rich powder increases the temperature and oxidizing effect of the oxygen cutting. The same lever that turns on the cutting oxygen also starts the powder flow. Valves are arranged so that the powder comes slightly before the oxygen, enabling the cut to be started without preheating. THE LINDE AIR PRODUCTS CO., 30 E. 42nd St., New York City 17.

STOODY Manganese

A low cost AC-DC electrode

Better welding properties ..Quicker build-ups!



Here's a Manganese electrode that sets new standards for weldability. Arc is exceptionally smooth and stable. Manganese content is not limited by manufacturing process — more than ample to insure a healthy reserve over the 11% minimum, as deposited. Stoody Manganese burns off rapidly — its heavy beads make for quick build-ups with low penetration. Special manufacturing process assures uniformity. Costs less, too!

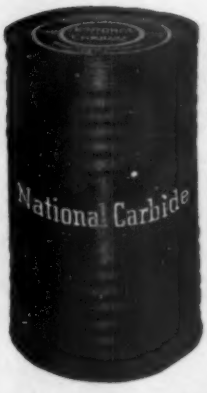
Try 50 lbs. of this smoother running electrode for use on repairing and building up all manganese steel equipment. Available in 1/4", 3/16" and 5/32" diameters, coated for AC — DC application, bare for DC application only. Available from distributors in all parts of the U.S.

- AC—DC APPLICATION
- SMOOTH, STABLE ARC
- RAPID BURN-OFF RATE
- LOW PENETRATION
- HIGH BUILD-UPS
- LOW SPATTER LOSS
- EASY SLAG REMOVAL
- FULL HADFIELD PROPERTIES

STOODY COMPANY
1141 W. SLAUSON AVE., WHITTIER, CALIF.

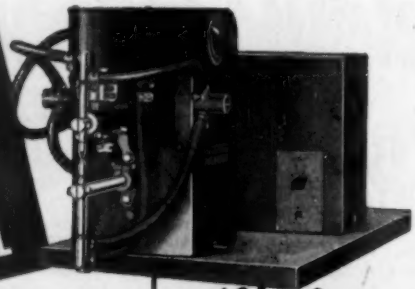
STOODY HARD-FACING ALLOYS
Retard Wear **Save Repair**

National
Carbide
EFFICIENT
ECONOMICAL
DEPENDABLE
for
Welding & Cutting
SPECIFY
NATIONAL CARBIDE IN THE RED DRUM
Write us for information as to nearest available stock.



NATIONAL CARBIDE CORPORATION
60 E. 42nd St., New York 17, N. Y.

PLUNGER ACTION • BENCH MODEL



Precision Welds
• METALS UP TO 20 GAUGE

A compact spot welding unit. Only 14" high. Designed for precision and production welding. Three station heat selectivity. Water cooled. 6" throat. Foot operated—weight return.

ELECTRONICALLY TIMED SPOT WELDER. WELDEX MODEL 111-PBMT

MANUALLY OPERATED
Weight Return

Weldex Inc.
Manufacturers of Precision Welders for Light Gauge Metals
7339 McDONALD AVE., DETROIT 10, MICHIGAN

DEALERS!
Cover the LIGHT METAL FIELD!

Weldex now offers a line providing complete coverage of this important market. If you are a substantial dealer in welding equipment, write for bulletins and our proposition.

Model
• 11-RFM Manually operated (Floor Style) 1 KVA
• 111-PBMT Manually operated (Bench Style) 1 KVA
• 362-PFM Manually operated (Floor Style) 3 KVA
• 263-A Air operated (Bench Style) 3 KVA
• 275-R, 275-P, 275-RS Manually operated (Floor Style) 7½ KVA
• 752-R, 752-P Air operated (Floor Style) 7½ KVA

MANUFACTURERS
Investigate this NEW METHOD of light metal fabrication. Ask for bulletins and folder showing accomplishments with Weldex Welders.

A-C Welders

NEWLY announced P & H welders are supplied with "Dial-lectric" controls said to eliminate the need for moving coils or cores. Current selection is made by

New P&H welder for a-c arc welding. A three-quarter turn of its single dial covers the full welding current range

turning a single dial, which requires but a three-quarter turn to cover the full welding range of the machine. Arc striking is said to be instantaneous, and the need for current boosters is eliminated.

All industrial models are designed for remote control, made possible by a removable control dial which provides amperage adjustment at the job for manual or automatic welding. Also included on the "Dial-lectric" are a high-low welding range for general-purpose welding and another range for light-gauge welding. These welders are offered in intermittent industrial and heavy-duty models, ranging up to 625 amp. HARNISCHFEGER CORP., WELDING DIVISION, 4400 W. National Ave., Milwaukee 14.

☆ ☆

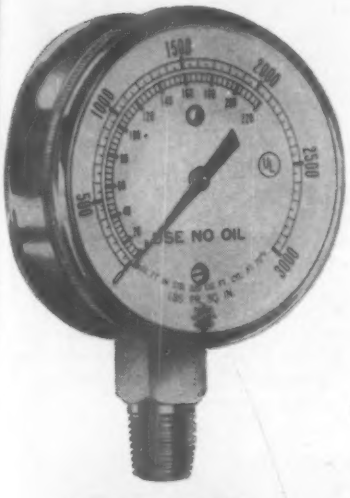
Portable Clamp

TOGGLE lock action of a new plier clamp holds parts up to 3/8-in. thick in position for welding. This clamp (Model 464) is specifically designed for sheet-metal work on such products as ducts, housings, auto bodies and aircraft assemblies. The tool is suitable for template locating and is adjustable for efficient pressures on various thicknesses of material. A narrow nose permits use of the clamp in restricted spaces. DETROIT STAMPING CO., Dept K, 372 Midland Ave., Detroit 3.

Model 464 clamp holds light gauge materials up to 3/8-in. thick

FOR prompt DELIVERY!

WITT
HIGH QUALITY GAUGES



ASSURE
LONG-LIFE
PERFORMANCE

Wherever oxy-acetylene service demands unexcelled quality and performance of pressure gauges *plus immediate shipment*, WITT GAUGE COMPANY's complete line of high and low pressure gauges satisfies the most exacting requirements. These precision 2″ and 2½″ gauges are the result of combining highly specialized equipment with expertly trained personnel—plus years of experience in making precision pressure regulators. WITT is one of NINE manufacturers having approval of Underwriters' Laboratories for high pressure gauges! Gauges are finished in polished and lacquered brass, scratch brush brass, nickel and chromium-plated. Connections: standard lower, right or left hand.

Catalog and quotations upon request.

WITT OXY-ACETYLENE
(Model shown is regular coined case available in both high and low pressure gauges.)

WITT OXY-ACETYLENE
(Model shown is plain (Peerless) case available in both low and high pressure gauges.)

witt GAUGE COMPANY
DIVISION OF NATIONAL PRESSURE COOKER COMPANY
EAU CLAIRE, WISCONSIN

EASTERN SALES OFFICE
[illegible] Liberty Street
New York 6, New York
Telephone: Barclay 7-1762

CLEVELAND-DETROIT SALES OFFICE
712 Marshall Building
Public Square
Cleveland 13, Ohio
Temporary Telephone: Cherry 3490

BOSTON SALES OFFICE
80 Boylston Street
Boston 16, Massachusetts
Telephone: Hubbard 1019

WESTERN SALES OFFICE
210 West 7th Street
Los Angeles 14, California
Telephone: Van Dyke 3805

Banner 50 KVA SPOT WELDER

DESIGNED FOR HIGH SPEED HIGH QUALITY Production

You get a clean, uniform job at top speeds with the new Banner 50KVA spot welder. For its free action, plus low inertia of rocker arm enable operator to positively space spots on long production runs.

The 50KVA Spot Welder has the same distinctive design and engineered simplicity as other Banner welders. Its lower arm is adaptable to a variety of jobs and principal parts are located for easy maintenance. For use in both job shops and highly geared assembly lines the Banner 50KVA has such features as eight ranges of heat selection with external adjustment, water cooled transformer and high conduction, high strength current carrying castings.

MODEL SR50A

For 220 or 440 V., 60 cycle — Foot or Air operation. Also available in 30 KVA capacity.

For further information, write for free illustrated Bulletin "Banner Welders and Brazers."

BP Co

BANNER PRODUCTS COMPANY

4936 NORTH 29TH STREET • MILWAUKEE 9, WISCONSIN

CHEK-SHOCK OXYGEN CUSHION VALVE

SOFTLY controls the vicious "jolt" of high pressure oxygen gas, thus eliminating regulator repairs and preventing possible injury to operators.

- Will allow tank valve to be opened rapidly without damage to regulator or danger to operator.
- Will increase life of regulator assembly.
- Will eliminate possible injury to operator from burstings.
- Will prevent unnecessary internal wear in regulator (*as NOT necessary to release control screw before opening tank valve*).

PRICE IS LESS THAN ONE REPAIR BILL ($6.00 EA.)

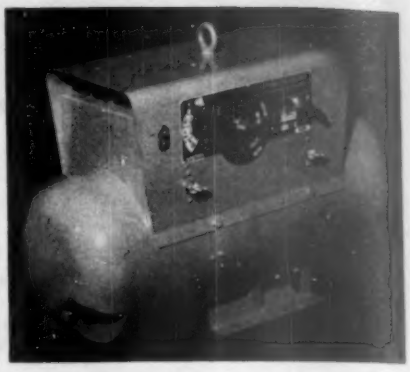
#1. STANDARD COUPLER . . . for all standard size welding type oxygen regulators.
#2. LIGHT COUPLER . . . for "airplane" or soldering size oxygen regulators.
#3. HEAVY DUTY COUPLER . . . recommended for extra heavy duty work only.
#4. SCREW TYPE COUPLER . . . for removable inlet stem regulators (¼" pipe) available in standard, light, or heavy capacities.
#5. FOR HYDROGEN . . . left hand thread coupler.

We also Make MEDICAL CHEK-SHOCKS for All Types of Medical Regulators and Tank Fittings (chrome plated). . . . $8.00 *Ea.*

SEE YOUR DISTRIBUTOR OR WRITE—

Chek-Shock MFG. CO.

FOWLER, CALIF.



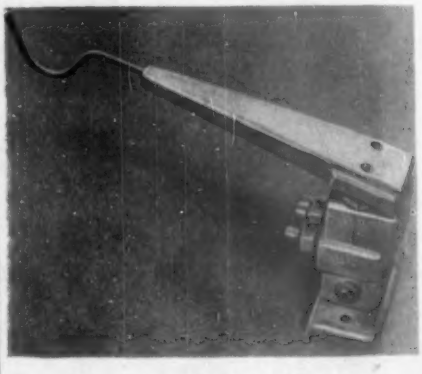
G-E's WD-40 high speed d-c welder

Portable d-c Welders

SINGLE-operator high-speed d-c arc welders, type WD-40, have been redesigned and are available in 200, 300 and 400 amp capacities, operating at 3,500 rpm. These new welders offer reduced sizes and weights and improved welding characteristics. Because full arc voltage is generated instantly after short circuit, the arc is easily established and maintained. A single-dial, dual-range control makes it possible for the operator to present the correct current for a given job without having to make other adjustments after the arc is struck. Weather-resistant end covers on the welder and control box can be easily removed for mechanical maintenance and inspection.

Standard assembly includes a stationery generator, driving motor, control cabinet and panel, and a motor starter. GENERAL ELECTRIC Co., Schenectady 5, N. Y.

☆ ☆



"Oxweld" V-30 dual shut-off valve

Argon Shut-off Valve

A NEW shut-off valve, Oxweld V-30, has been designed to cut down the consumption of argon in production inert-gas welding. It is operated by an extension lever on which the torch is hung when not in use. Both argon and water supply are immediately cut when the torch is hung on the hook. When torch is removed, the valve opens and allows argon to flow at the preset rate.

The valve has a self-sealing type of packing that is designed for operating pressures up to 100 psi. Each unit is supplied with an adjustable base that may be set for either wall or bench mounting. THE LINDE AIR PRODUCTS Co., 30 E. 42nd St., New York City 17.

USE CMD HAMMERS FOR *Every* WELD CLEANING NEED!

TYPE A

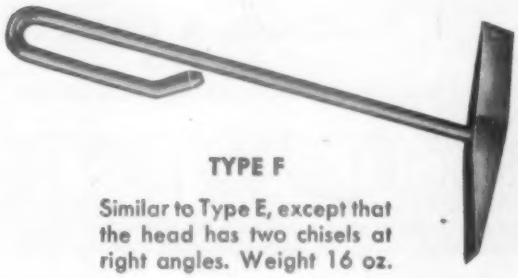
Drift and Chisel. Made from high-grade tool steel. Popular in malleable iron and grey iron foundries for general chipping.

TYPE E

Head made of high-grade ¾ inch square tool steel, has combination drift and chisel for general chipping purposes. Special hand grip absorbs shock. Weight 16 oz.

TYPE CB

Triple Duty. Combines 3 tools in 1—drift, chisel, and removable wire brush.

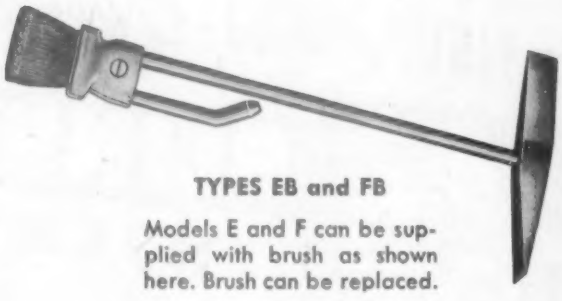


TYPE F

Similar to Type E, except that the head has two chisels at right angles. Weight 16 oz.

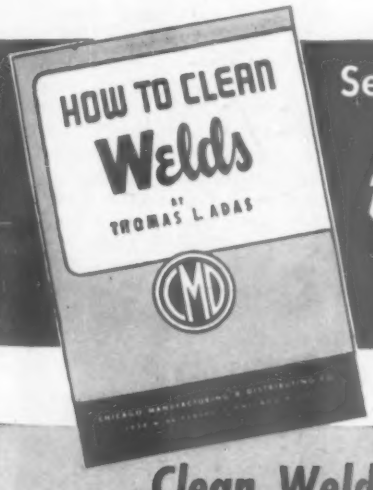
TYPE C

Drift and Chisel. Same as Type CB but without brush.



TYPES EB and FB

Models E and F can be supplied with brush as shown here. Brush can be replaced.



Send For This **FREE BOOKLET** TODAY!

Authentic information for experienced and apprentice weldors.

Order CMD Hammers from your local welding supply house.

Chicago Manufacturing & Distributing Co.
1928 West 46th Street, Chicago 9, Ill.

Please send without obligation _____ copies of the booklet "How to Clean Welds."

NAME.....

FIRM NAME.....

ADDRESS.....

CITY.....ZONE.....STATE.....

Clean Welds Mean Sound Welds — Lasting Satisfaction

"FLUXINE" Fluxes are the result of over fifty years of scientific research into the metal-joining field. There are 89 FLUXINE Fluxes . . . one for every welding, silver soldering, brazing, and soft soldering operation . . . each with its own properties, designed for a particular metal-joining operation. All have been perfected not only for highest efficiency, speed, and long life, but for economy and safety as well. FLUXINE Fluxes cause no injurious fumes to irritate eyes or nose of the operator.

So confident are we that wherever a metal-joining operation is required FLUXINE Fluxes will do it better, faster, and more economically than any competitive fluxes, that we will be glad to have you try it at our expense.

Write on your company letterhead for a generous sample stating which FLUXINE Flux you desire.

Ask your jobber for Fluxine Fluxes . . . he knows the FLUXINE line produces the best results with the greatest economy.

KREMBS & COMPANY

Est. 1875

Dept. G, 669 W. Ohio St., Chicago 10, Ill.

FLUXINE

FLUXES TO JOIN ALL METALS

TRADE MARK REGISTERED U. S. PAT. OFF.

The NEW *Chin-Operated...*

BLINKER HELMET

Moving chin down 1/4 inch pulls lever A down so that lenses B drop 3/4 inch, permitting full vision through helmet's clear-cover glass. Raising chin instantly raises dark lenses because of spring C.

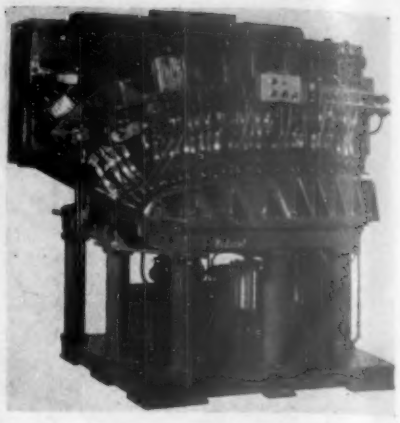
- **Speeds Up Fit-Up**
- **Makes It More Accurate**
- **Leaves Both Hands Free**

With the Blinker Helmet, a weldor can tack work in place up to 6 times faster. And the fit-up is more accurate because everything is where he wants it when he strikes his arc. No other helmet offers chin-operation that eliminates tilting to see work. Light. Comfortable. Safe. At your jobber's. Write for descriptive circular!

WELDING APPARATUS COMPANY

2750 WEST VAN BUREN STREET • CHICAGO 12, ILLINOIS

Also Makers of POSITIVE ARC A. C. Arc Welder



Federal's 32-electrode spot welder

Multiple Spot Welder

A 32-GUN "Multi-point" spot welder has been designed for welding auto front fender stampings to fender rails. The unit also houses welding transformers, clamping cylinders and sequencing control. The steel clamping arm is actuated by two cylinders through a system of toggle links. The fixture stroke is from 6 to 8 in., permitting ease of loading and unloading, dressing or changing of dies and electrodes.

A hydraulic pumping unit supplies the oil pressure for operating the 32 double-acting welding guns, which are equipped with water-cooled electrode holders and tips. There are nine welding transformers, eight of which are employed when the 32 spot welds are made on a fender of normal size. All nine transformers are employed for the larger size fender on which 34 spot welds are made. Half of the transformers may be fired at a time or all arranged to fire simultaneously.

All operations are automatic. The four machines (two right fender and two left fender) set up in one plant are producing in excess of 40 welded assemblies per hour per machine, states manufactureer. THE FEDERAL MACHINE AND WELDER CO., 15 Dana St., Warren, O.

☆ ☆

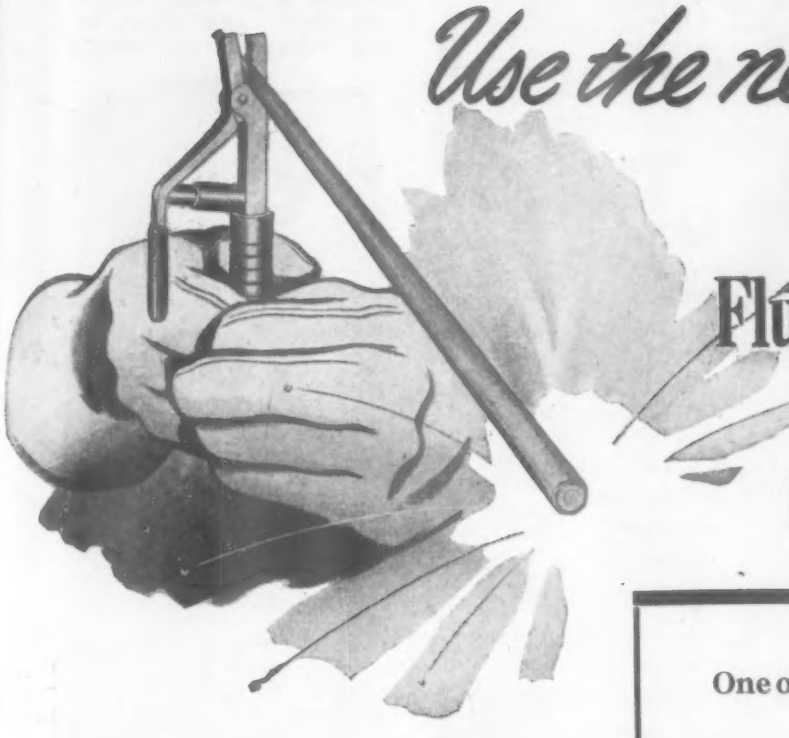
Low-Temperature Electrodes

"EUTECTRODES 66 AC and 660 DC" are two new electrodes for low-temperature welding of all types of steel. "Eutectrodes 66" can be used for such jobs as welding low-carbon to high-carbon steel, welding low-alloy, high-carbon, cold-drawn and heat-resistant steels and overlaying and filling the cast-iron alloys that are used on glass molds, dies and similar parts. These electrodes are said to produce smooth high-tensile, crack-resistant weld deposits. They are available in 3/16, 5/32, 1/8 and 3/32 in. diameters. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

☆ ☆

Outlet Box

A MULTI-PLUG outlet box (Model 3001-A) solves the problems of insufficient wall outlets in factories and workshops. It contains eight standard receptacles and can be plugged into any wall outlet, a-c or d-c, 110-125 volts. Model 3002-A is used for 220-250 volts. ALLIED LABORATORY INSTRUMENT, INC., 355 W. 26th St., New York City 1.



Use the new HAYNES Flúx-Coated Rods on your next hard-facing job

Fast, easy application
Sound, uniform deposit
Steady, quiet arc
Easy slag removal

HAYNES hard-facing alloys with greatly improved coatings are now available for metallic arc welding. Use them on your next job to protect metal parts from abrasion, heat, and corrosion.

The registered trade-marks "Haynes," "Haynes Stellite," "Hascrome," "Hastelloy," and "Haystellite" distinguish products of Haynes Stellite Company.

One of These HAYNES Hard-Facing Rods Will Do Your Job

1. HAYNES STELLITE Rods . . . cobalt-chromium-tungsten alloys . . . high in red hardness and highly resistant to abrasion and corrosion.
2. HAYNES STELLITE "93" Rod . . . iron-base alloy . . . resistant to abrasion.
3. HASCROME Rod . . . iron-base alloy containing chromium and manganese . . . work-hardens under impact.
4. HAYSTELLITE Rods . . . tungsten-base alloy and steel binder . . . extremely resistant to abrasion.
5. HASTELLOY Rods . . . nickel-base alloys . . . resistant to heat and abrasion and highly resistant to corrosion.

Haynes Stellite Company
Unit of Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Chicago—Cleveland—Detroit—Houston
Los Angeles—New York—San Francisco—Tulsa

HAYNES TRADE-MARK *alloys*

Removes HARMFUL FUMES ON-THE-JOB
—with no connection to outside air!

The M·S·A
Welding Fume Exhauster

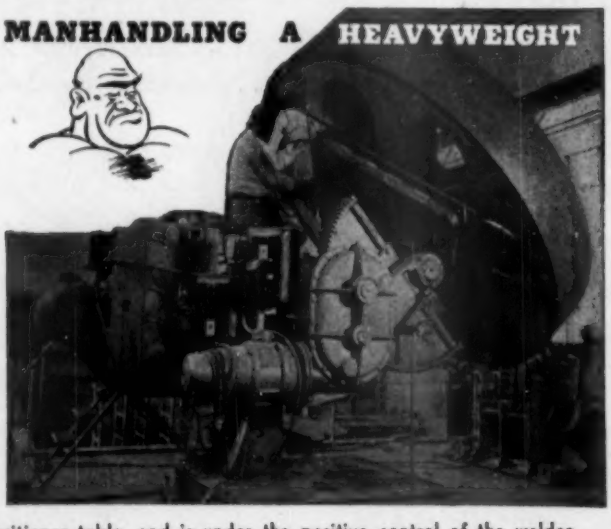
Here is a complete and compact unit for removing welding fumes from the air of confined spaces—so simple that any welder can employ it without assistance in setting up. Assures safe clean atmosphere, protecting the health of workers and promoting increased production. Scientific in principle—practical in operation—requires no hoods, fixtures, or connection to ventilating ducts.

- SELF-CONTAINED
- LIGHTWEIGHT
- COMPACT
- SIMPLE TO USE
- EASY TO MAINTAIN

Write for complete construction and operating details on this outstanding new M.S.A. development—request descriptive Bulletin No. CU-1.

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH 8, PA.
District Representatives in Principal Cities

MANHANDLING A HEAVYWEIGHT



Here is a Model 140 C-F Positioner, handling a large, unwieldy weldment with great safety to men and weldment. The weldment is clamped or tact welded to the Positioner table, and is under the positive control of the welder who can tilt the table to 135° from horizontal or to any point at any speed in a circle of 360°. When great weldments are being handled, they are up out of the way—require less floor space and are always under the welder's control. C-F Power operated models with variable or constant speed table rotation have become important production tools in today's greater emphasis on welding for peacetime products. Drilled table is a convenient platen, permitting a wide choice of setting-up means, or is easily removed to provide for jigs or special features. Write for Bulletin WP-22, which gives complete information on C-F Welding Positioners.

CULLEN-FRIESTEDT CO.
1309 S. Kilbourne Ave. **Chicago, Illinois**

Multiple Welder

A MULTIPLE welder, model MGMS2-8, provides hot upsetting, spot welding or projection welding of intricate small parts to a steel panel in one operation. This

Multiple welder operates on three-phase system and performs three jobs

Sciaky model is an open-throated assembly of individually controlled welding guns, with transformers and control equipment compactly mounted on either side.

The parts to be welded are placed in a locating jig by one operator, while a second operator is placing a previously loaded jig over the retractable lower platen. By releasing the jig all parts drop into lower dies. Meanwhile the operator on the other side places the panel in position. An air cylinder then moves the platen up until a contact is made with the conductor from the transformer. The upper electrodes, which are shaped to fit the parts, are then in welding position.

A telephone-jack type of control board permits any desired timing sequence. Operation on all three phases of the supply line is achieved by use of this manufacturer's "Three Phase" system. SCIAKY BROS., INC., 4915 W. 67th St., Chicago 38.

☆ ☆

Welding Clamp

A HANDY locking welding clamp is said to simplify the welding of split fenders and similar jobs by quickly aligning the

"Vise-Grip" welding clamp for repairing split fenders and other such jobs

parts for welding. This "Vise-Grip toggle-wrench tool is equipped with deep-throated U-shaped jaws which fit over the work without interferring with visibility and working space. A 2¾ in. throat permits the tool to reach well over the work, and the jaws may be adjusted up to 1⅝ in. for varying widths of material. PETERSON MFG. Co., DeWitt, Neb.

FOR POWER TRANSMISSION

From Primary line to welding apparatus
From welding apparatus to operator at the arc
"ADMIRAL" POWER CABLE
"MAJOR" WELDING CABLE
"ADMIRAL" two-three and four-conductor
"MAJOR" single conductor

"ADMIRAL"

#18 to #6 SIZES

RUBBER COVERED, FLEXIBLE PRIMARY POWER CABLE USED WITH AC. OR DC. TYPE ELECTRIC ARC WELDERS, TOOLS MOTORS, EXTENSIONS, ETC.

"MAJOR"

#6 to #4/0 SIZES

RUBBER COVERED SUPER-FLEXIBLE WELDING CABLE, IDEAL FOR TRANSMISSION OF CURRENT FROM WELDING APPARATUS TO POINT WHERE WELDING IS DONE

MILLIONS OF FEET HAVE BEEN SOLD

• PROMPT SHIPMENTS — USUALLY FROM STOCK •

WELDING ENGINEERING COMPANY
MILWAUKEE, WISCONSIN
MANUFACTURERS — DISTRIBUTORS
OFFICES AND AGENTS ALL OVER THE UNITED STATES

TYPE DXB BOOSTER
For Welding Booths—Spray Booths and Duct Installation.

TYPE CP PRESSURE BLOWER
General Purpose Industrial Type. All Sizes and Capacities.

Use the Powerful

CHELSEA OCTOPUS

FOR EXHAUSTING DANGEROUS WELDING, BRAZING OR SOLDERING FUMES—OR FOR VENTILATING CONFINED AREAS

The CHELSEA OCTOPUS, Jr., is ideal because it is portable and will operate in any position. One to four hoses may be used, and newly-designed blower wheel forces huge volumes of air through the unit for uninterrupted exhausting or ventilating. Write Dept. WE today for literature describing industrial blower equipment.

CHELSEA PRODUCTS • INC
1206 GROVE STREET, IRVINGTON 11, NEW JERSEY

INSIST ON CERTIFIED RATINGS!

SAVE PRECIOUS FLOOR SPACE . . .
. . . INCREASE PRODUCTION WITH

REED TURNING ROLLS

PORTABLE TYPE
VARIABLE SPEED DRIVE

• • •

NOW AVAILABLE IN
FOUR SIZES

Model 60 Capacity— 6,000 Lbs.
Model 120 Capacity—12,000 Lbs.
Model 250 Capacity—25,000 Lbs.
Model 500 Capacity—50,000 Lbs.

Capacities rated with one power and one idler unit.

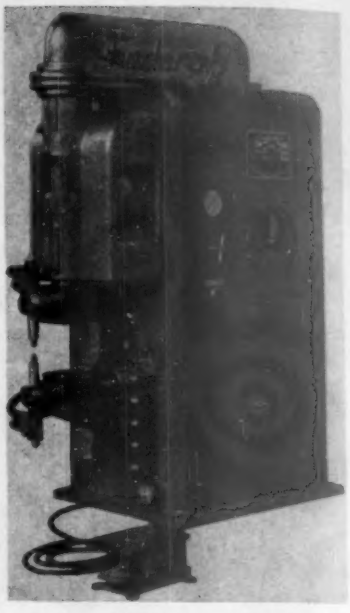
Prices $875 and up per set.

F.O.B. Factory

These units can be used for rotating practically any type of cylindrical work for either manual or automatic welding and will soon pay their initial cost in labor savings alone.

We also build a complete line of unit type machines, welding gantrys, horn jigs, plate bending rolls and special jigs and fixtures for automatic welding.

REED ENGINEERING COMPANY
ENGINEERS AND MANUFACTURERS
CARTHAGE, MISSOURI, U. S. A.



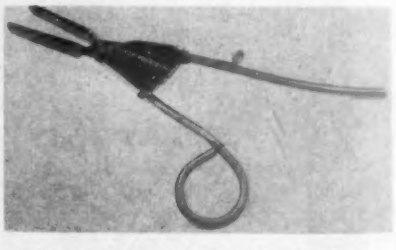
Bench-type combination spot and projection welder has six heat steps

Combination Welder

A GENERAL-PURPOSE, bench welder combination is offered with both holders for spot-welding electrodes and T-slotted platens (optional equipment) to hold projection-welding dies. This machine is capable of welding mild steel, stainless steel or aluminum sheets on a production basis. It is equipped with a low-inertia rubber head with micro-switch firing. The vertically adjustable lower knee is standard as are the horns and the water-cooled, ejector-type electrode holders. The 2¼-in. stroke is actuated by an air-operated double-acting cylinder. The 30-kva transformer has six steps of heat regulation controlled by a tap switch.

A plug-in foot-operated switch leaves the operator's hands free to handle the material. The welder has a throat depth of 6 in. from the machine face to the center line of the electrodes and a depth of 4½ in. from the machine face to the center of the platens. THE FEDERAL MACHINE AND WELDER CO., 15 Dana St., Warren, O.

☆ ☆



Safety tongs provide added finger protection and faster work handling

Safety Tongs

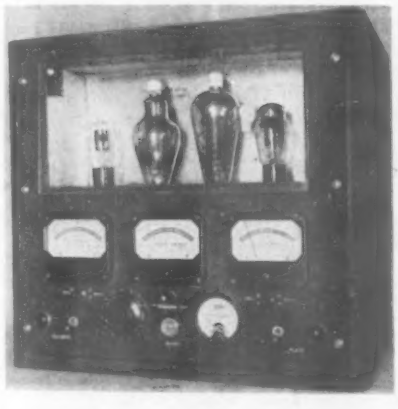
SAFETY tongs with a finger guard provide extra protection and faster work handling of material. The guard is so placed that it offers a protected point of leverage for the index finger. These lightweight, corrosion-resistant tongs are of drop-forged steel and have a long, thin, soft iron nose to prevent die breakage. WOLVERINE TOOL CO., 480 E. Woodbridge St., Detroit 7.

Automatic tank unit for welding pressure vessels, boilers, etc.

Welding Positioner

A NEW type welding positioner for use with automatic welding heads is said to aid greatly in the fabrication of tanks, pressure vessels and boilers. It is adaptable to any standard welding head and combines turning rolls for rotating the work at variable speeds with a longitudinal track supporting the welding head for lengthwise movement. The unit is made in two sizes: "SD" for work up to 84 in. diameter and "SDH" for work up to 120 in. diameter. It can be adjusted to any size of vessel within its range and can also be used with additional idler units for long work beyond the normal range. REED ENGINEERING CO., West Fairview Ave., and Mo. Pac. R. R., Carthage, Mo.

☆ ☆



Tester for welding control electronic tubes

Tube Tester

DESIGNED specifically for welding control tubes, a new tube tester tells at a glance the state of emission and indicates internal short circuits of type 82 and 83 rectifiers as well as FC-33, FG-95 and 632 thyratrons. Terminals are provided for a cathode-ray oscillograph, which is used in conjunction with the tester to predict the future life expectancy of a tube. This is done by indicating the condition of the voltage drop within the tube. SIERRA ELECTRONIC CORP., San Carlos, Calif.

☆ ☆

Coating for Filler Rods

"EUTECTO FILM" is the name of a new metallic coating to be applied to bare gas welding rods. The coating is said to protect the rod from corrosion and increase the rate of flow because of the chemical alloying between the coating and filler rod. This reaction, states manufacturer, also lowers the bonding temperature and minimizes distortion and scaling. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

In the Glare of the Torch— think of WILLSON

Style CW60

ROOM WANTED FOR SPECTACLES? . . . There's comfort for wearers of prescription glasses in Willson Cover-Alls.* And the adjustable leather bridge rests lightly on the nose without pressure. Willson-Weld* lenses in the shade you specify, of course.

Style RW50

GAS WELDERS GO FOR IT . . . Assured protection of Willson-Weld lenses and comfortable face fit make this goggle day-in, day-out favorite for flame cutting and cleaning as well as welding. Indirect ventilating ports exclude glare.

Style DC50

FOR EYES THAT LEAD A DOUBLE LIFE . . . From welding to chipping with a flip of the wrist! Willson-Weld lenses in separate frames flip up to leave eyes protected by clear, Super-Tough* lenses.

For complete information on these products and their application, as well as many more eye and respiratory protective devices, get in touch with your nearest Willson distributor or write us direct.

*Reg. U. S. Pat. Off.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE WILLSON

PRODUCTS INCORPORATED

Established 1870

227 WASHINGTON ST. • READING, PA.

Without a Dependable MIXER You Haven't Got a GOOD TORCH!

When a torch has a mixer that will function with dependable efficiency, using tip sizes 00 to 12 inclusive . . . compensating for both welding gas pressures and welding tip sizes—and one that will produce a *longer, hotter* flame, using the same gas pressures, you may be sure that *that* torch is trade-marked MECO.

Make your own comparison to prove our claims—a demonstration is all you will need.

What Equipment are YOU using Now? Meco Write us for the Address of Your Nearest Distributor

MODERN ENGINEERING COMPANY, INC.

3411 WEST PINE BLVD. • ST. LOUIS 3, MISSOURI

HARD SURFACING for Body Protection

When abrasion, corrosion, galling impact or erosion threaten the life of parts and tools, build up and protect surfaces with MIR-O-COL, the hard-surfacing welding rod. MIR-O-COL is the specialist in hard-surfacing with

SIX Different Rods for SIX Applications

NO. 1—for hard, thin welds.
NO. 2—to resist heavy impact.
NO. 3—shatterproofing and tough.
NO. 4—hard and dense.
NO. 5—to resist heat, oxidation and corrosion.
NO. 6—non-ferrous—resists heat and corrosion.

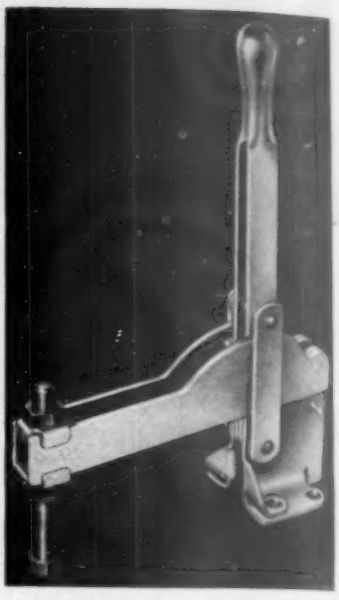
Write today for free booklet, "Welder's Guide to Successful Hard-Facing."

WHITEHEAD METAL PRODUCTS COMPANY, INC.

303 WEST 10TH STREET, NEW YORK 14, N. Y.

Philadelphia—Newark—Buffalo—Boston—Baltimore—Syracuse—New Haven—Rochester—Albany

Headquarters also for aluminum, brass, nickel alloy, NI-ROD and steel welding rods.



"Jumbo" toggle-action clamp gives 1,350 lbs. at the toggle bar

Heavy-Duty Clamp

A HEAVY, toggle-action clamp called the "Jumbo" is capable, through the normal pressure of a man's hand, of exerting a force of 1,350 lb. at the extreme end of the toggle bar. By virtue of an ingenious design there is not more than 3/16 in. deffection at the spindle. This big clamp (14⅝ in. high and 9⅞ in. long) permits the spindle to be adjusted longitudinally along the toggle bar to accommodate various placements of work at the pressure point without changing original location of the clamp. The spindle assembly can be removed and replaced by any special pressure pad to meet the user's specialized requirements. KNU-VISE, INC., 2200 Eighth St., Detroit 16.

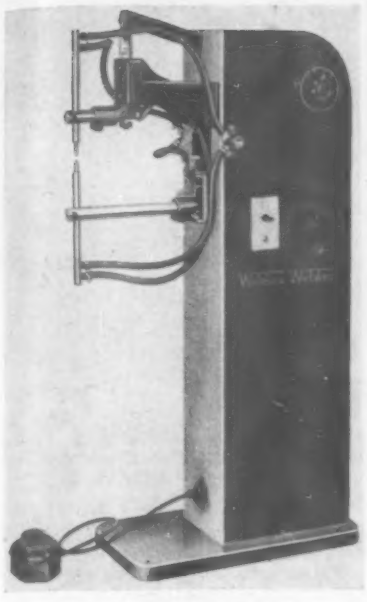
☆ ☆

Combination battery charger and arc welder available in two models

Welder Combination

OUTSTANDING features of a new portable battery charger and arc welder combination are: (1) it fully charges up to four completely discharged batteries; (2) an automatic circuit breaker protects against reverse-polarity connections and short circuits (3) choice of three welding heats offered; (4) torch attachment for bracing and soldering may be added.

The unit is available in two models: "Larkweld 77," a 30-amp charger and 75-amp welder, and "Larkweld 77-PFC," a 10-amp charger and 55-amp power-factor-corrected welder. Both models operate from a 115-volt, 60-cycle power source. LARKIN LECTRO PRODUCTS CO., 160 W. 146th St., New York City 30.



This spot welder handles two thicknesses of up to 14-gauge steel sheet

Spot Welders

A SERIES of two high speed, air operated and electronically timed spot welders is offered by Weldex, Inc. Model 752-P is a press-type model and Model 752-R, a rocker-arm type welder. Both models are rated at 7½ kva and are suitable for continuous production welding of thin metals up to two thicknesses of 14-gauge cold-rolled steel or equivalent. Features include a built-in water-cooled transformer, foot switch, solenoid air valve, single-acting air cylinder, adjustable air-operated pilot switch, magnetic contactor and electronic timer which automatically controls all phases of the welding cycle. Transformer has a special winding and insulation said to provide longer life. WELDEX, INC., Dept. K, 7339 McDonald Ave., Detroit 10.

☆ ☆

Hard-facing Electrode

A NEW hard-facing electrode, W-94, is offered by the ELECTRIC WELDING DIVISION, GENERAL ELECTRIC CO., Schenectady 5, N. Y., for applications where resistance to impact and for abrasion is desired. Operating on a-c and on d-c reverse polarity, the electrode is available in 14 in. lengths and in diameters of ¼, 3/16, 5/32 and ⅛ in. The deposited metal will work harden to 50 Rockwell C.

☆ ☆

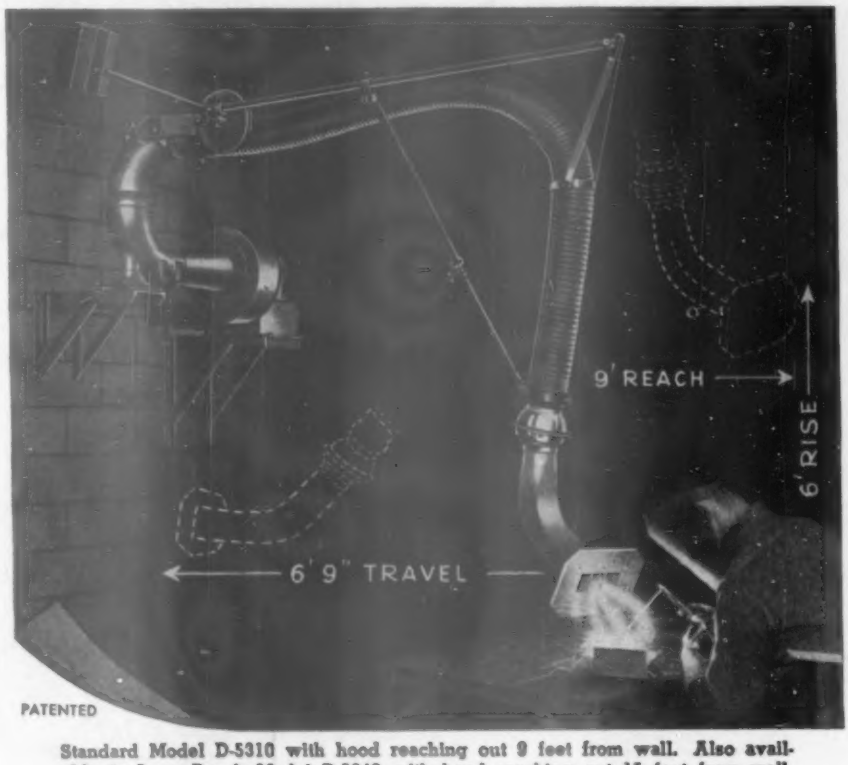
Fire Brick

A NEW insulating brick for building preheating furnaces or holding small weldments is said to be radically different in design in that it consists of a mass of trapped air cells, each of which is a fortification against heat conductivity. Manufacturer claims that the brick may be heated with an oxy-acetylene torch for half an hour and then grasped without harm only an inch from the area on which the flame played. The brick measures 2½ by 4 by 8 in. and can be readily sawed, even with a wood saw. WELDING EQUIPMENT & SUPPLY Co., 223 Leib St., Detroit 7.

"I WORK IN CLEAN FUME-FREE AIR —thanks to our RUEMELIN FUME COLLECTOR"

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated *at their source*, thus improving working conditions, lessening fatigue and paving the way for increased plant production.

The Ruemelin Fume Collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustments necessary. Just pull the inlet hood to the welding position and you are ready to go. Approved by state industrial commissions and by compensation insurance companies. Simple to install. Thousands in service. Many users send in repeat orders. Write for bulletin 37-C today.



Standard Model D-5310 with hood reaching out 9 feet from wall. Also available in Long Reach Model D-5342 with hood reaching out 15 feet from wall.

RUEMELIN MFG. CO.

3880 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS • SAND BLAST AND DUST COLLECTING EQUIPMENT • WELDING FUME COLLECTORS

REBUILD SHOVEL & DIPPER TEETH

MANGANAL

(Trade Mark Reg. U. S. Pat. Off.)

NAME OF NEAREST DISTRIBUTOR UPON REQUEST

11% to 13½% MANGANESE NICKEL STEEL

WEDGE BARS

Repointing teeth with MANGANAL is a lot cheaper than replacing equipment. And these wedges take impact and abrasion better than new Manganese Steel teeth! Easy to attach by welding with Manganal Bare or Special Tite-Kote Welding Electrodes. For super-duper wear, use an overlay of Seaco.

FREE FOR THE ASKING! Our Booklet "The Welding of 11% to 14% Manganese Steel."

STULZ-SICKLES CO.

Sole Producers

91 N. J Railroad Avenue, NEWARK 5, N. J.

Save Material!

(MEND THE HOLE IN THE BOTTOM AND YE CAN COOK IN THE WHOLE KETTLE)

with

YORK'S 77

CAST IRON BRAZING

FLUX

1. Fear of overheating can be forgotten.
2. Cleaning and grinding are unnecessary, because "York's 77" penetrates through grease, oxides, etc.
3. Chipping is unnecessary, because a satisfactory bond can be obtained on oxidized surfaces.
4. Deteriorated cast iron can always be welded successfully with "York's 77."

YORK ENGINEERING COMPANY

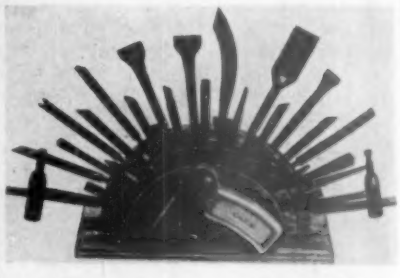
3349 OGDEN AVE. • CHICAGO 23, ILL.

Model DBS bench grinder makes dual grinding operations easier

Bench Grinders

RECOMMENDED for such operations as weld grinding, removing flash, flat and edge work and all types of clean up and polishing operations is a new double belt bench grinder (Model DBS). Driven by a 1-hp motor, the heavy-duty shaft mounts two 7-in.-diam by 2½-in.-wide contact rolls side by side, providing for the use of two abrasive belts 2½ in. wide by 60 in. in circumference. The result is a two-station grinder—one station can be fitted with a coarse abrasive belt for rough grinding and the other with a fine grit belt for finishing. A dust guard is so designed that particles will naturally follow to an outlet in the rear of the unit. PORTER-CABLE MACHINE CO., Syracuse, N. Y.

☆ ☆



All-angle air hammer gets in the hard-to-get-at places by changing head angle

Adjustable Air Hammer

HEAD of this new air hammer may be quickly adjusted from the 90-degree position to any desired angle through a full 180-deg arc. This feature is said to be a definite time saver for weldors and others working in hard-to-get-to places. A special built-in needle valve provides light or heavy hammer action. Total weight of the hammer is less than 3½ lb, and it consumes only 5 cu ft of air per minute at 90 psi pressure. WEN-LYN PRODUCTS, Burbank, Calif.

Silver Solder

A NEW silver solder, All-State No. 120, containing 20% silver is said to give a higher tensile strength than solders with a greater content of silver. Recommended for such applications as brazing carbide tips to steel shanks and for the fabrication of light steel parts, the solder melts at 1,430 F and has a sheer strength of 145,000 psi. It is said to have a high capillary action. Steel, brass, copper, stainless steel and Inconel are among the metals to which it can be applied. This solder is available in wire, strip or rings. ALL-STATE WELDING ALLOYS CO., INC., 96 W. Post Road, White Plains, N. Y.

"Water Saver" automatically shuts off water valve during idle periods of r-w machines

Water Saver

USE of a new device is said to relieve resistance-welding operators of the duty of shutting off the cooling water. The "Water Saver" is arranged so that its two control relays and solenoid-operated water valve are de-energized if the welding machine is stopped for a period longer than 30, 60 or 90 seconds—the three delay times available. De-energizing the water valve stops the flow of cooling water. As soon as the welding machine is started, the Water Saver's initiating transformer is energized, and cooling water is again allowed to flow. The unit is enclosed in a heavy sheet-metal cabinet, with all component parts mounted on a control panel, easily removable for inspection. Power supply is 115, 280, or 460 volts, 60 cycles, single phase. WELTRONIC Co., 19500 W. Eight Mile Road, Detroit 13.

☆ ☆

Two-stage pressure regulators for all welding and cutting jobs

Two-Stage Regulators

A LINE of precision-made pressure regulators has all machine parts, including bodies and caps, turned from solid bar stock. This "760 series" of regulators include styles for light and heavy oxy-acetylene welding and cutting. Pressure of the compressed cylinder gases is reduced by two separated valve seat and diaphragm assemblies. This two-stage reduction method offers constant gas delivery regardless of the decrease in the cylinder contents and also helps the regulators to control and soften the sudden compression of full cylinder pressures. NATIONAL WELDING EQUIPMENT CO., 218 Fremont St., San Francisco 5.

IT'S NO TRICK AT ALL

WHEN YOU USE MARQUETTE

REGISTERED U.S. PAT. OFFICE

NICOL·44

THE ORIGINAL And BEST

This outstanding Marquette A. C. - D. C. Nickel Rod is a copper-nickel alloy with a special heaving coating which gives excellent welding characteristics of fine grain, tight and strong welds. Safe to use . . . there are no injurious fluoride fumes to harm eyes, nose or throat.

MACHINEABLE CAST IRON WELDS

Makes perfect bond to parent metal and leaves a soft, close grained *Machineable* weld on all types of metal *without* preheating. Thoroughly Machineable . . . you can easily drill or mill it. There is a complete absence of porosity, slag inclusion or hard spots and it matches parent metal perfectly.

NO PRE-HEATING

Saves hours of work on machinable cast iron welding jobs. May also be used for welding cast iron to steel, copper to steel and monel metal.

WORTH ITS WEIGHT IN GOLD

Marquette Nicol-Rod No. 44 has been used for years in shops and foundries for salvaging epensive castings which otherwise would be rejected because of blow holes, and sand pockets. It is truly a money saver in maintenance and production for repairing castings inexpensively.

USE ALL MARQUETTE ELECTRODES

Take advantage of Marquette's *Know How* and use the many other famous Marquette Electrodes. Buy the Rod-Pak, Weld-All Kit . . . or buy the Carload! Single order quantity discounts on 250 pounds or over.

SOLD EXCLUSIVELY THRU THE NATION'S LEADING DISTRIBUTORS

MARQUETTE Welding EQUIPMENT

A.C. ARC WELDERS ELECTRODES
ACETYLENE GENERATORS ACCESSORIES
OXY-ACETYLENE WELDING & CUTTING EQUIP.

REGISTERED U.S. PAT. OFFICE

MARQUETTE MFG. CO., Inc., Minneapolis 14, Minn.

COMPLETE CARBON BRUSH DATA

SPECIFICATIONS FOR ALL MAKES AND TYPES OF WELDING EQUIPMENT

yours for the asking

Twenty-eight pages of easily found information, complete with factory model numbers, replacement brush numbers, scaled illustrations of brushes listed, and all other necessary data. Here is a regular "Encyclopedia" of Brush information covering all types and makes of welding equipment.

SEND FOR YOUR FREE COPY NOW!

B·B·B Stands for Quality ... KEEN-ARC CARBONS

BECKER BROTHERS CARBON CO., 3450 So. 52nd Ave., Cicero 50, Ill.

EASY TO WORK WITH!

That's an important reason why more and more shops are using low-temperature welding. Low-temperature welding techniques make it possible for operators with but a few hours' instruction to turn out welds that are startlingly perfect.

You have to see low-temperature welding demonstrated—that's when you will understand why jobs can now be done easily that once took high skill. Drop in and see your local distributor of the All-State line of welding and brazing alloys and fluxes. He'll be glad to give you a demonstration.

And you can learn more about the low-cost advantages of low-temperature by sending to the address below for a copy of the latest edition of the All-State catalog B-10.

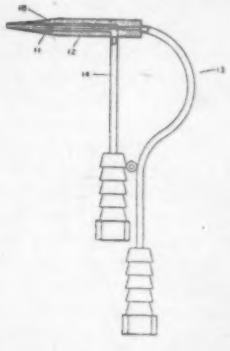
ALL-STATE WELDING ALLOYS CO., Inc.
98 WEST POST ROAD • WHITE PLAINS, N. Y.

From the Patent Office

Hydrogen-Fluorine Torch

2,421,649. HOMER F. PRIEST, N. Y., and ARISTID V. GROSSE, Bronxville, N. Y., assigned to the UNITED STATES OF AMERICA. Filed Feb. 13, 1943. Issued June 3, 1947.

A method of welding or cutting metal



by heating it with a flame formed by the combustion of hydrogen and fluorine under pressure. The pressure of the fluorine is greater than the pressure of the hydrogen.

☆ ☆

Welding Apparatus

2,423,096. GILBERT GILLIVER, London, England, assigned to STANDARD TELEPHONES AND CABLES, LTD., London, England. Filed March 26, 1945, in Great Britain, April 21, 1944. Issued July 1, 1947.

A tool for the fusion welding of conductors. The conductors are clamped with their ends in a fixed position with respect to a welding electrode and a shutter is normally interposed between the conductors and the electrode. The independently actuated means for advancing the electrode into contact with the cable ends, also causes the withdrawal of the shutter out of the path of the electrode.

☆ ☆

Welding Electrode

2,422,489. THEODORE E. KIHLGREN, Scotch Plains, and CHARLES E. LACY, Westfield, N. J., assigned to THE INTERNATIONAL NICKEL CO., INC., New York City. Filed June 30, 1945. Issued June 17, 1947.

An arc-welding electrode adapted to form weld deposits substantially devoid of hot cracks. Its core wire contains at least 75% nickel, 10% chromium and minor proportions of silicon. A flux coating encloses the core wire. This electrode contains columbium in such quantities that the residual columbium content in the weld deposit will be at least 4½ times the residual content of silicon in the deposit.

HAVE YOU RECEIVED YOUR COPY OF THE

METRO CATALOG?

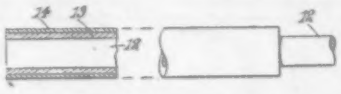
MAKE THIS YOUR BUYING GUIDE FOR SAFETY AND WELDING EQUIPMENT

SEND TODAY FOR YOUR COPY *covering this* COMPLETE LINE *of* SAFETY EQUIPMENT *and* WELDING *and* CUTTING APPARATUS

METRO
MANUFACTURING CO.,
Long Island City 1, N. Y.

Underwater Welding Electrode

2,421,594. ROBERT HENRY FARMER BOOT, London, England, assigned to UNDER WATER WELDERS & REPAIRERS, LTD. Filed Feb. 21, 1945, in Great



Britain, Dec. 15, 1943. Issued June 3, 1947.

An arc-welding electrode consisting of a steel core covered over its working surface with a layer of flux and over the flux a continuous outer skin of a tough solid polymer. The latter is selected from the class consisting of vinyl and substituted vinyl compounds. The layer of polymer is intimately mixed with the flux at the interface between the two layers.

☆ ☆

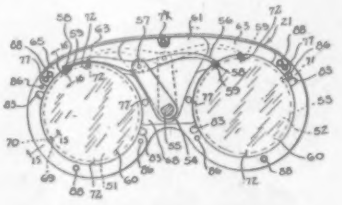
Hydrogen Welded Tubing

2,422,305. WALTER KOPEC, Cleveland, assigned to REPUBLIC STEEL CORP., Cleveland. Filed Oct. 24, 1942. Issued June 17, 1947.

In an arc process of progressively weld-

ing together the longitudinal edges of moving tube blank, the steps of positioning in the blank a short distance in advance of the point of welding an obstruction which completely fills the blank and delivering hydrogen gas under pressure into the blank between the obstruction and point of welding. The gas flows out of the blank between the unwelded edges, and the lengthwise flow of gas is directed in the direction of travel of the blank and along lines generally parallel to its axis.

☆ ☆



Variable Density Goggle

2,422,287. DANIEL P. BERNHEIM and EDWARD M. SPLAINE, Southbridge, Mass., assigned to AMERICAN OPTICAL CO., Southbridge. Filed May 4, 1942. Issued June 17, 1947.

A goggle having a pair of front lenses, held against rotation and a pair of rear lenses rotatably mounted in the unitary rigid front. Spacer means separates the front and rear lenses. A spring frictionally engages the back lenses; and a link pivotally connects each of the back lenses. A rotatable knob is connected to a lever arm having its other end pivotally connected to the link to cause rotation of the rear lenses. The link and lever arm are located within a recess in the rigid front.

Better Your *PROFIT* Position with a better *WELDING* Position

When you position the work for *downhand* welding with a Ransome Positioner, you gain these advantages:

- Production increases up to 50%.
- Labor savings up to one-half.
- Better quality work, with smoother, stronger welds.
- Reduction in welding rod waste 5% to 7%.
- Reduction in crane service and accident hazards.

No matter what your positioning problem may be, Ransome can furnish equipment to solve it. Send for Bulletin 210B.

Visit our Booth No. 130 at Metal Show in Chicago, October 18-24

Model 400 Positioner—capacity 20 tons

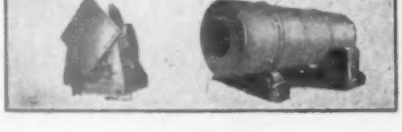
Industrial Division

Ransome MACHINERY COMPANY
Dunellen, N. J.

Subsidiary of
WORTHINGTON
Pump and Machinery Corporation

Y-7-8

Ransome Positioners and Turning Rolls . . .
Capacities 100 Lbs. to 75 Tons



Fuse-Well
Cast
Welding Rods

THE STANDARD OF QUALITY
Throughout the World

CAST ALUMINUM
WELDING RODS
OF STANDARD ANALYSIS

PLAIN AND ALLOYED GRAY IRON
WELDING RODS
AND ELECTRODES

THE CHICAGO HARDWARE FOUNDRY CO.
Dependable Since 1897
1047 ENGINEERING BUILDING
NORTH CHICAGO, ILLINOIS

WELD-A-CAST FLUX

WELD-A-CAST
OXY-ACETYLENE WELDING FLUXES

Ask your dealer — or write

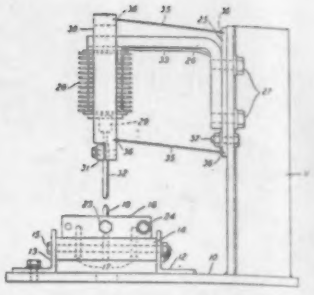
The Old Brand is Still the Best

No. 1. For Welding with Cast Iron Rod.

No. 3. For Brazing and Bronze Welding.

No. 4. For Welding Cast Aluminum.

CORTLAND WELDING COMPOUND CO.
Cortland, N. Y.



Bench Welder

2,421,021. WALTER B. ELLWOOD, N. Y., assigned to BELL TELEPHOHE LABORATORIES, INC., N. Y. Filed March 2, 1945. Issued May 27, 1947.

A bench spot-welding machine comprising a base, an electrode mounted on the base, a second electrode movable toward and away from the first and a pair of parallelopipedon springs for guiding the movement of the second electrode.

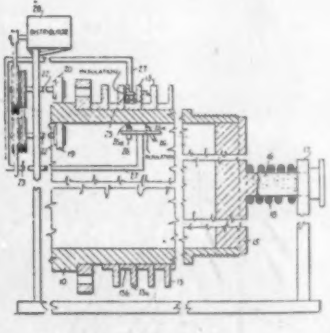
☆ ☆

Pressure-Welding Apparatus

2,421,070. ROY S. KERNS, Chicago, assigned to THE LINDE AIR PRODUCTS CO., New York City. Filed Feb. 9, 1944. Issued May 27, 1947.

The flame of this oxy-acetylene pressure welding apparatus carries a means for supporting two elongated metal members with a surface of each member in abutting relation and also a plurality of clamps for clamping each of the metal members at a plurality for longitudinally spaced points. Each clamp may be vertically adjusted independently of the other clamps, but all clamps are movable as a unit to and from clamping position. The metal members thus clamped are moved toward each other while being heated to a welding temperature at and adjacent the butting surfaces.

☆ ☆



Spot Welder

2,420,332. ALFRED VANC, New York. Filed Dec. 11, 1943. Issued May 13, 1947.

A device for spot welding fins of L cross-section helically wound on a cylinder. It includes means for supporting and rotating the cylinder and substantially preventing the longitudinal movement and an electrode mounted to move longitudinally of the cylinder while engaging against the sides of the fin and the base. On rotation of the cylinder and fin, the electrode is longitudinally fed along the cylinder by the fin in a screwlike manner.

NOW! TRACTOR GROUSERS *that* OUTWEAR TRACKS

COLMONOY NO. 1

Insures Traction Efficiency

Here's another road engineering firm—this time in British Columbia—using Colmonoy No. 1 to keep its tractor grousers up to size. Shortly after this tractor was put in service the grouser bars were given a "once over lightly" with Colmonoy No. 1. The grouser plates shown in the snapshot have outlasted two sets of tracks. They have just received their second overlay of Colmonoy and are ready to give full traction efficiency again.

This hard-facing alloy can withstand the heavy shock and loading of the largest tractors. It takes abrasion in its stride. It is economical because of its extreme resistance to wear, and its deposition efficiency—no slag or spatter loss.

COLMONOY *Hard-facing* ALLOYS

Available in many grades, with different properties. There's a grade for every hard-facing operation, including spray welding of Colmonoy in powdered form, using the famous Colmonoy Spraywelder that combines welding and metallizing.

WRITE FOR FULL INFORMATION AND NAME OF NEAREST JOBBER

WALL COLMONOY CORPORATION
Hard Facing Alloys
19345 JOHN R STREET • DETROIT 3, MICHIGAN

Master Hands on Intricate Jobs use

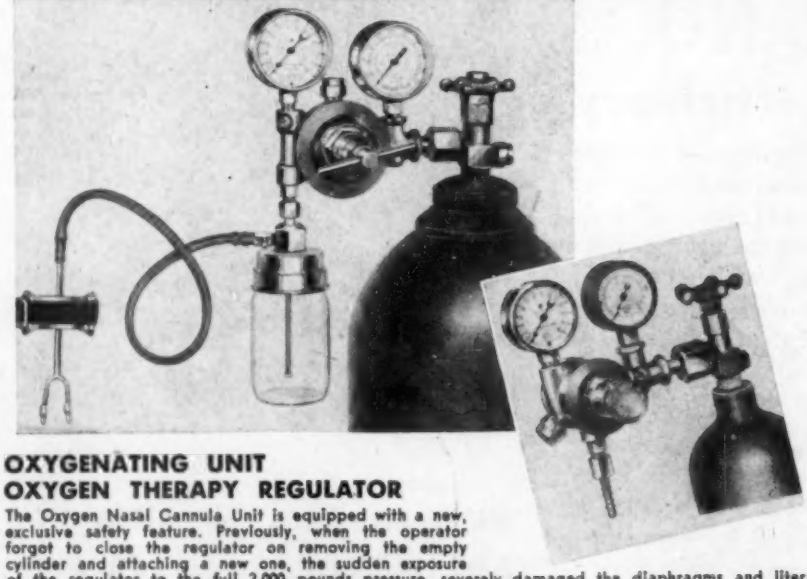
SHAWINIGAN CARBIDE

SHAWINIGAN

SHAWINIGAN PRODUCTS CORPORATION

EMPIRE STATE BUILDING,
NEW YORK 1, N.Y.

HOSPITALS GO FOR THESE ITEMS---



OXYGENATING UNIT
OXYGEN THERAPY REGULATOR

The Oxygen Nasal Cannula Unit is equipped with a new, exclusive safety feature. Previously, when the operator forgot to close the regulator on removing the empty cylinder and attaching a new one, the sudden exposure of the regulator to the full 2,000 pounds pressure, severely damaged the diaphragms and liter gauge. With this new safety device, whether the regulator has been left open or closed in changing cylinders, no damage occurs.

OXYGEN NASAL CANNULA UNIT, NO. 219. Adopted to self-administration; eliminates the use of mask. Oxygen is humidified in passing through wash bottle, thereby reducing dryness of nasal musoca.

OXYGEN THERAPY REGULATOR NO. 234—Illustrated. Junior type (for G, K, D, or E Cylinders). Easily adapted to ambulance installation on emergency inhalator or for any inhalation and resuscitation apparatus. Send for 16-page MEDICAL OXYGEN THERAPY CATALOG.

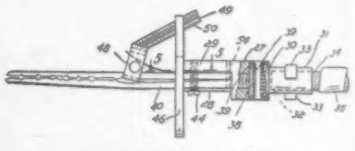
JOHN NAGELDINGER & SON, INC.
Established 1880
FACTORY AND OFFICE AT 409 E. 91ST ST., NEW YORK 28, N. Y.

Electrode Holder

2,419,789. JAMES E. PAULSON, Long Beach, Calif. Filed July 11, 1945. Issued April 29, 1947.

An electrode holder comprising a handle, an electrode-clamping bar having a front end notched portion, a short jaw pivotally connected to the bar and having a notched portion complementing the notched portion of the bar and means to swing the jaw. The latter means comprises a rod pivoted at one end for lateral swinging movement and movable endwise as an incident to lateral swinging. The endwise movement is accomplished by a link pivotally connected at opposite ends to the bar and rod, respectively, for overthrow movement of the pivotal connections to rod past dead center relation to the pivotal connections of the link to the bar and the rod to the jaw.

☆ ☆

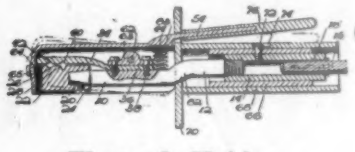


Electrode Holder

2,417,547. THOMAS S. DONNELLY, Detroit, Mich. Filed Nov. 21, 1941, and July 12, 1943. Issued March 18, 1947.

An electrode holder jaw having an elongated, platelike gripping member. Lateral wings project outwardly from and beyond opposite sides of the gripping member intermediate its ends.

☆ ☆



Electrode Holder

2,423,058. FRANK G. VAN DYKE, Detroit. Filed Sept. 30, 1943. Issued June 24, 1947.

In an electrode holder, the combination of pivoted male and enclosing female rod-gripping jaws. An opening through the wall of the female jaw receives the electrode, and a spring tension means tends to close the jaws.

☆ ☆

Weld-Cleaning Tool

2,423,189. JACK C. HONHART, Detroit. Filed Sept. 10, 1943. Issued July 1, 1947.

A cleaning tool for welds and the like, comprising a handle with a head fixed to one end. The head has two oppositely directed tapered openings in which instruments having tapered shanks are interchangeably seated. The head is being formed with bores extending parallel to the handle and intersecting said openings adjacent their bases; a leaf spring has its intermediate portion secured to an end of the spring, tapered ends projecting into the bores. Each pin is movable upon deflection of the spring into contact with the shank of the instrument seated in the corresponding bore to move the shank outwardly of the opening. Leaf spring substantially parallels the head.

WOOLDRIDGE ALFLUX No. 3
CAST ALUMINUM BRAZING FLUX

ALFLUX No. 3 is a multiple purpose flux which has been developed especially

for Soldering — *and Brazing*
Steel to Aluminum — Aluminum castings
Copper to Aluminum — Aluminum Sheets

This flux may also be used with good results on other metals. ALFLUX No. 3 is manufactured of the highest quality pure chemicals which have been thoroughly and carefully compounded. It is an exceptionally fine flux which adheres to the surface to be brazed and produces a faster and more economical weld.

WOOLDRIDGE ALUMINUM WELDING PRODUCTS, INC. Glastonbury, Conn.

"SAF-T"

Welders' Garments

The Accepted Line of *Protective* LEATHER CLOTHING

No. 627
Cape and Bib

COATS • APRONS • GLOVES
PANTS • OVERALLS • BIBS
CAPES • SLEEVES

Write for Catalog, Samples & Prices

Protect your workmen from welding glare by using Jessar's SAF-T CURTAINS made of fine quality, heavy flame-proof duck.

ALJAY MFG. CO., Inc.
1230 Vine St., Phila. 7, Pa.

Acetylene Storage

2,422,251. MAURICE O'BRIAN, St. Louis, and EDWARD R. BIGGINS, Indianapolis, Ind., assigned to THE LINDE AIR PRODUCTS CO., New York City. Filed Sept. 13, 1941. Issued June 17, 1947.

A filler mass in a cylinder for the storage of compressed acetylene. It comprises a porous monolithic mass of a calcium silicate in which the ratio of calcium oxide and silica is substantially 53.3 parts by weight of silica to 36.7 parts by weight of calcium oxide. This mass includes up to 10 parts by weight of asbestos fiber, based on the combined weight of the calcium, silica, and asbestos fiber. The amounts of calcium oxide and silica each vary not more than plus or minus 2%. The mass has a crushing strength of over 900 psi, a porosity in excess of 80% and uniformly distributed pores invisible under a magnification of 960 diameters.

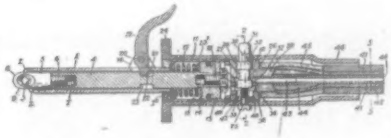
☆ ☆

Flameproof Fabrics

2,420,644. LYMAN C. ATHY and PAUL C. STUFFT, Baltimore, Md., assigned to PEMCO CORP., Md. Filed June 16, 1942. Issued May 20, 1947.

A fabric base material flameproofed with a solid vitreous enamel silicate, which fuses adjacent the combustion temperature of the base material to a viscosity which enables it to be retained on the base material. The enamel silicate is formed by smelting the components at a temperature above its melting point to produce a homogeneous vitreous silicate.

☆ ☆



Electrode Holder

2,422,385. ALF E. ANDERSON, Milton, Mass. Filed March 30, 1945. Issued June 17, 1947.

In an electrode holder, an elongated tubular metallic cap having at least two hubs extended angularly from the upper end. These hubs are provided with spaced, aligned openings for receiving an electrode in at least two angular positions with respect to the axis of the cap member. A clamping rod extending in to the cap member coöperates with the walls of the openings to clamp the electrode in selected angular position.

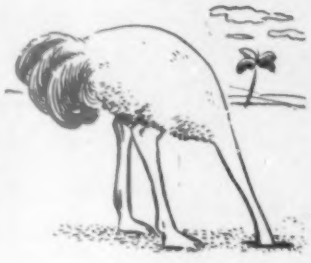
☆ ☆

Electrode Holder

2,423,324. VERNON R. JOHNSON and LESTER W. WACHTER, Streator Ill., assigned to ANTHONY DEVELOPMENT CO., Streator. Filed Dec. 2, 1944. Issued July 1, 1947.

An electrode gripping means comprising a part and a member movably mounted to move there along. The member is shaped to engage a welding electrode, and a spring is biased to move the member inwardly to hold the electrode between the member and said part. A piston is formed on the member and air under pressure is conducted to a cylinder. The piston is thus caused to move against the resistance of the spring to carry the member outwardly. The air also serves as a coolant.

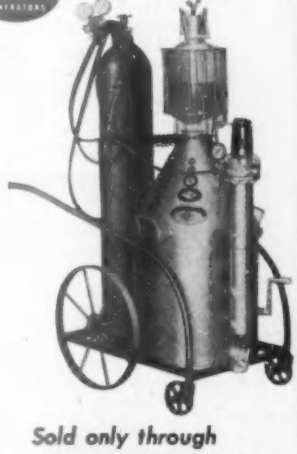
Out of sight ...out of mind!



• Don't let your acetylene be "Out of sight—out of mind!" Users of "bottled" acetylene know that they often run out in the middle of a weld or cut—because the gauge shows only the available pressure and not the amount of acetylene that remains in the cylinder.

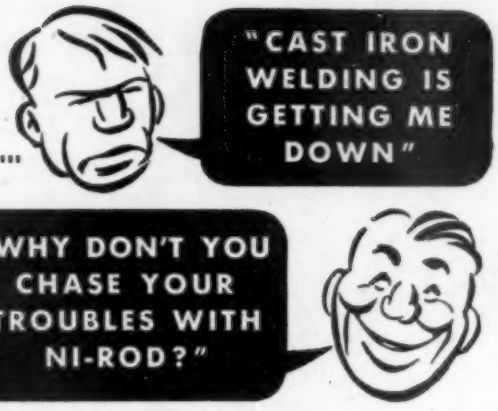
You see as you save with Sight Feed Acetylene Generators—because the carbide is always visible through the transparent Pyrex hopper.

Don't let your acetylene be "Out of sight—out of mind"—use Sight Feed. Get full details from your distributor or write for catalogue 44-G.



Sold only through Recognized Distributors

THE SIGHT FEED GENERATOR CO.
RICHMOND, INDIANA



Yes, sir, NI-ROD electrodes get rid of welding problems . . . but fast!*

No worry about porous welds, poor fusion, or slag inclusions. NI-ROD deposits are high strength, crack-free, and machinable.

Works on either a.c. or d.c. . . . welds in all positions . . . seldom requires preheating. Try them and you'll agree NI-ROD electrodes are the tops for cast iron welding.

Stocked in 3/32", 1/8", 5/32" and 3/16" sizes.

*Reg. U. S. Pat. Off.

STEEL SALES CORPORATION

WAREHOUSES

Chicago 23, 3348 S. Pulaski Rd.
Detroit 10, 5151 Wesson Ave.
St. Louis 10, 4565 McRee Ave.

BRANCH OFFICES

Indianapolis 2, 1916 N. Meridian St.
Milwaukee 4, 647 W. Virginia St.
Minneapolis 15, 529 S. 7th St.

SEND FOR INSTRUCTION BOOKLET

FOR PRODUCTION CONSTRUCTION MAINTENANCE AND REPAIR

PROFITABLE WELDING WITH *Easy to Operate* **TRINDL** SUPER INDUSTRIAL **ARC WELDERS**

A Range of Models for Every Welding Job!

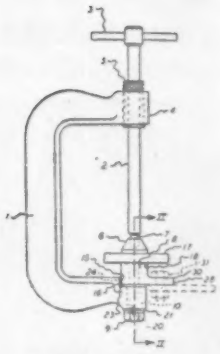
"Job tested" TRINDL WELDERS, outstanding in the welding field because of the Simplified Operation and Ruggedness of Design and Construction, are unbeatable for practical efficient low cost operation. TRINDL WELDERS, preferred for general industrial and automotive production, construction, maintenance and repair, are available in a range of models for every type of shop or welding job.

DEPENDABLE TRINDL WELDERS, WELDING SUPPLIES & ACCESSORIES ARE AVAILABLE TO SAVE YOU BOTH ... TIME AND MONEY

Write, wire or phone today for particulars and catalogs

JOBBER AND DISTRIBUTOR INQUIRIES INVITED
Write for Selected Distributor Plan.

TRINDL PRODUCTS LTD., 17 E. 23rd St., AR, Chicago 16, Ill.



Ground Clamp

2,420,895. HENRY H. MERRIMAN, Jackson, Mich., assigned to HARRY D. BOARDMAN, Jackson. Filed November 7, 1942. Issued May 20, 1947.

A c-shaped welding ground clamp having a lug-receiving portion at one end and provided with an upstanding shoulder. Clamping means at the other end of the body moves toward and away from the lug-receiving portion. The contact lug is of polygonal form with a plurality of side faces and an end face serving as a contact surface. A wire-attaching tap projects laterally from one of the side faces, in a plane spaced away from the plane of the contact surface of the lug. When the contact lug is mounted on the lug-receiving portion with the connecting tab extending in a desired direction, it is held against twisting movement, and a wire joined to the connecting tab will be held out of the plane of the contact face of the connecting lug.

☆ ☆

Acetylene Safety Device

2,422,225. JOHN J. CROWE, Westfield, N. J., assigned to AIR REDUCTION SALES CO., INC., New York City. Filed Jan. 1, 1945. Issued June 17, 1947.

The combination with an acetylene generator of a source of gas capable when mixed with the acetylene in the generator of reducing the explosion hazard by raising the disassociation pressure of the acetylene. The gas is automatically admitted to the generator during periods which coincide approximately with the periods when there is an acetylene demand on the generator.

☆ ☆

Oxygen Generator

2,421,381. LESLIE G. JENNESS, Buffalo, N. Y., assigned to THE LINDE AIR PRODUCTS CO., New York City. Filed July 3, 1942. Issued June 3, 1947.

A process for producing gaseous oxygen alternately passing flowing streams of air and steam at pressures above two atmospheres in contact with a solid manganate mass maintained at a temperature between 1100 and 1300 F. The contact mass has the ability to be oxidized by the passage of air and thereafter to be deoxidized and release oxygen by the passage of steam in contact. When the activity of the mass becomes so impaired that it loses some of its ability to take up oxygen, it may be reactivated by maintaining it in a hot condition and flowing over it a stream of air at a pressure greater than the operating air pressure.

GAS LIGHTER

Many superior design and construction features combine to make the Improved "Round File" the most efficient and economical torch lighter.

An unusually large file area (approx. one sq. inc.) is provided. The file is of superior quality, hardened in our own factory. Spark metal is of large diameter and the patented cartridge holding the metal locks exactly into position, permitting instant replacement.

SAFETY GAS LIGHTER CO.

(Est. 1901)

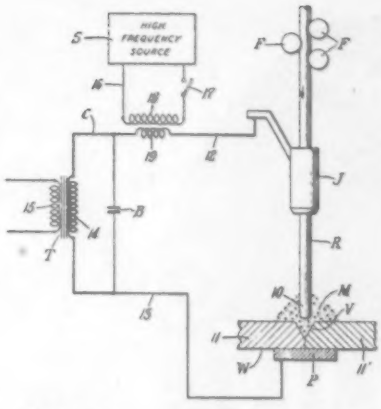
LYNN, MASSACHUSETTS

"SPE-WELD"

LOW TEMPERATURE WELDING RODS AND FLUXES FOR *ALL METALS*

Send for new 24-page booklet

SPECIAL WELDING ALLOY CO., INC.
27-33 Jackson Avenue
LONG ISLAND CITY 1, N. Y.

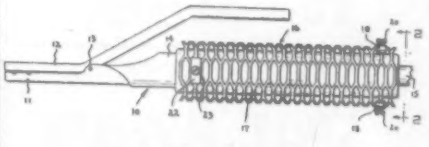


High-Frequency Submerged Welding

2,423,515. EDWARD D. MORRIS, Chicago, assigned to THE LINDE AIR PRODUCTS CO., New York City. Filed Aug. 22, 1942. Issued July 8, 1947.

An improvement in the submerged-melt welding process which comprises an auxiliary source of high-frequency electric energy so as to produce sparking across the bridge of granulated material between the end of the fusible electrode and the work. This establishes a path sufficiently conductive to start the fusion welding operation under the blanket of granulated welding material, which is non-conductive when cold.

☆ ☆



Holder Guard

2,424,437. WALLACE R. DENT, Chicago. Filed Sept. 13, 1945. Issued July 22, 1947.

A heat-dissipating grip for electrode holders comprising a tube with many small openings. Internally screw-threaded nuts secured adjacent opposite ends of the grip; screws entering the nuts to hold the grip in spaced concentric relation on the handle of an electrode holder.

☆ ☆

Butt Welder

2,422,756. JOHN STRUK and ROBERT W. GOOD, Brooklyn, assigned to MURRAY MANUFACTURING CORP., Brooklyn. Filed March 14, 1944. Issued June 24, 1947.

A resistance welder with two movable, spaced electrode supports carry electrodes arranged to accommodate two pieces of metal between them in contact with each other. Upon the heating of the metal pieces in the area between the electrodes, they are moved toward each other whereby a weld is effected by the metal of one piece flowing into the other. A burr is extruded. To minimize this burr, a fluid jet is positioned to direct an oxidizing fluid under pressure along the weld. A valve interposed in the connection between the jet and the oxidizing fluid. Means operative as the weld is effected actuates the valve to permit the oxidizing fluid to be discharged from the jet, reducing the burr and removing blobs of metal.

TUNGSTEN FOR WELDING

CLETUNG Atomic Hydrogen and Heliarc Welding Electrodes are a thoroughly engineered, highest-purity Tungsten product designed to eliminate crazy arc. Furnished in a wide range of sizes, in lengths as specified, which will enable you to reduce butt losses and so obtain greater economy. Rod surfaces are prepared to give maximum electrical contact with the holder, for highest efficiency. Cleveland-Tungsten welding specialists invite consultation on your problems.

CLETALOY Resistance Welding Alloys—alloys of Tungsten-Copper, Tungsten-Silver, Molybdenum-Copper, and Molybdenum-Silver, for use in resistance welding—are offered under the name CLETALOY and varied in composition precisely to meet the requirements of each user. These alloys are made to provide maximum conductivity in relation to hardness. There is a correct formula for each application. Cleveland-Tungsten welding technicians will gladly recommend the right grade.

Cleveland-Tungsten Products Engineered by Specialists to Meet Your Particular Needs Let The Cleveland-Tungsten Technical Staff Advise You

CLEVELAND TUNGSTEN INCORPORATED
10200 MEECH AVENUE
CLEVELAND 5, OHIO

Leading the Field...

WELDALOY

RESISTANCE WELDING ELECTRODES

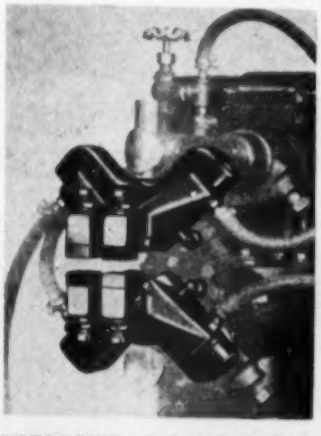
QUALITY carefully maintained by expert metallurgical control.

FAST DELIVERY assured by greatly expanded production facilities.

ENGINEERING SERVICE available to help you with special alloy and welding problems.

WELDALOY PRODUCTS CO. DETROIT

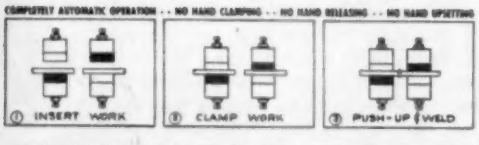
. . . . MAKE YOUR SPOT WELDER A BUTT WELDER *IN 2 MINUTES* SIMPLE • INEXPENSIVE



HOFFMAN

BUTT-ON-SPOT

AUTOMATIC BUTT WELDING ATTACHMENT


COMPLETELY AUTOMATIC OPERATION . . NO HAND CLAMPING . . NO HAND RELEASING . . NO HAND UPSETTING
① INSERT WORK
② CLAMP WORK
③ PUSH-UP (WELD

WELDING EQUIPMENT MANUFACTURERS USERS DISTRIBUTORS

Write today for information on this time-saving, money-saving attachment.

★ The Hoffman Butt-On-Spot Attachment is a water-cooled, *completely automatic* butt welding attachment designed to fit any spot welder having a minimum horn clearance of 7"—manual, air operated, or motor driven.

Maximum capacity dependent on welder KVA capacity but recommended maximum is ⅜" dia. round stock, 5/16" square stock, and ⅜"x¾" rectangular stock.

ROBERT W. HOFFMAN CO., INC.

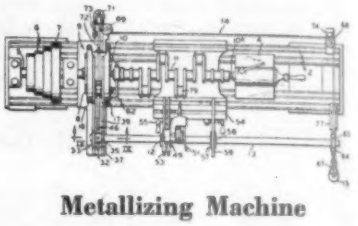
8 S. CLINTON STREET, CHICAGO 6, ILL.

Electrode Holder

2,423,758. THOMAS S. DONNELLY, Detroit. Filed April 10, 1944. Issued July 8, 1947.

An electrode holder with a metallic cup-shaped, internally threaded member having a radial opening for reception of the butt end of an electrode. An insulating covering has an opening registering with the opening in the cup-shaped member. A presser member has a socket formed in one end for reception of the end of an electrical conductor and to threadable at its opposite end inwardly and outwardly of the cup-shaped member. The cup-shaped member is adapted, upon inward threading of said presser member to overlay a portion of the socket. A wear plate mounted on said presser member has a face opposed to the inner face of the base of the cup-shaped member, and the inner end of the presser member has a concentrically formed socket which engages a stud projecting outwardly from the wear plate for rotatably mounting wear plate on presser members.

☆ ☆



Metallizing Machine

2,424,418. ROBERT ROBY, East Greenwich, R. I. Filed Aug. 2, 1945. Issued July 22, 1947.

In a machine for projecting a jet upon a body rotating in an orbit, a jet projector, adjustable along a support lengthwise of the axis of the orbit, spaced crossheads in which the support is rotatably mounted and means for reciprocating one crosshead and simultaneously swinging the support. The latter means consists of a connecting rod and a crank unit comprising a pair of coaxially mounted discs, a center mounted on one disc and a crank pin connecting them. Crank pin is adjustable radially of the discs. A means actuated by the reciprocation of the last-mentioned crosshead imparts the same reciprocation to the other crosshead.

☆ ☆

Low-Temperature Welding

2,424,522. RENE D. WASSERMAN, New York City. Filed March 8, 1944. Issued July 22, 1947.

A process for bonding together adjacent butt ends of tubing, piping and like tubular elements by interposing between the butt ends a flexible, solid sheet of alloy material. The alloy material has a melting point below that of the tubes to be bonded and a thickness between 0.003 and 0.04 in. Heat is applied to the outer wall parts of the tubes and the interposed sheet of alloy material until the alloy becomes fluid. The enclosed central portion of the alloy sheet then creeps toward the inner wall parts and between the butt ends, forming a bonding seam. Inner diameter of the tubing is substantially free from the central sheet portion of alloy material.

Easier Handling

IN ALL MODELS!

Gasweld

CUTTING and WELDING TORCHES

Test them on your own work! Prove to your satisfaction that Gasweld Torches cut "handling fatigue." You'll find that output goes up . . . and production costs go down.

There's a Gasweld Torch for every need—from featherweights to heavy duty types—the right torch for every job.

Gasweld's free-flow jet mixer assures superior Welding and Cutting in all torch operations. Forged heads and rear ends give longer service—*with less maintenance.*

Gasweld Welding and Cutting Torches are approved by Underwriters' Laboratories.

- A COMPLETE LINE
- EXTRA RUGGED
- LONGER SERVICE

See this Gasweld WG-25 Welding Torch and other Gasweld torches in operation at the National Metals Show October 18-24 Booth 2417

THE Liquid WALL CHEMICALS DIVISION CARBONIC CORPORATION
3110 South Kedzie Avenue, Chicago 23, Illinois
Branches and Dealers in Most Principal Cities

Metal Show CHICAGO Oct. 18-24 VISIT OUR BOOTH No. 2417

Get the Facts!
Write for your copy of this helpful booklet.
MAIL COUPON TODAY!

THE LIQUID CARBONIC CORPORATION
3110 S. Kedzie Avenue, Chicago 23, Illinois

Gentlemen: Please send me immediately without obligation full information on Gasweld Welding and Cutting Equipment and Supplies.

*Name*_____

*Firm*_____

*Address*_____

*Town*_____ *State*_____

The Welder Farmers Want!

The

GREYHOUND

Six Outstanding Sales Features make it profitable to handle GREYHOUND Farm Welders

- Can be used on any farm with suitable power lines. Greyhound Farm Welder meets NEMA standards and conforms to EEI and REA requirements.
- Built-in power factor correction, ideal for rural poser lines.
- Safe-frame and housing of welded steel electrically grounded metal case.
- Continuous current control, quick adjustment by simply turning a hand wheel providing infinite number of current settings.
- Portable—easily moved about.
- Economical to operate.

Dealers! Distributors!

Some territories still open . . Write today

Greyhound offers a complete line of
HEAVY-DUTY INDUSTRIAL
A.C. ARC WELDERS
Send for catalogs.

GREYHOUND A. C. ARC WELDER CORP.

Main Office and Plant:
604-606 Johnson Ave., Brooklyn 6, N. Y.

Export Department:
75 West St., New York City.
Cables: "DAVTEXCOE" New York.

Seam Welder

2,423,067. HANS H. HANSEN and CLYDE E. SMITH, Warren, O., assigned to THE TAYLOR-WINFIELD CORP., Warren. Filed June 16, 1944. Issued June 24, 1947.

In a seam welder, means to effect intermittent rolling movement of the electrode with respect to the work being welded, means to conduct welding current to the electrode at times intermediate the periods of the relative movement and means operable synchronously with the intermittent-movement-effecting means to apply welding pressure to the electrode while it is stationary and to remove it during the rolling movement.

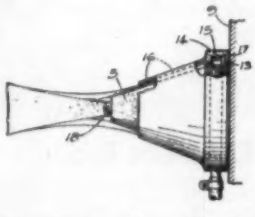
☆ ☆

Welding Control

2,424,324. SLAVO J. MURCEK, Duquesne, and ROBERT W. PRICE, Murrysville, Pa., assigned to WESTINGHOUSE ELECTRIC CORP., East Pittsburgh, Pa. Filed Jan. 7, 1944. Issued July 22, 1947.

A control system for use in supplying current for arc welding to a variable impedance load. It comprises an electronic tube interposed between the source and load to control the flow of current, means for developing a voltage which varies with the load current, and control means responsive to the voltage for controlling the electronic tube in order to maintain substantially constant load current while the impedance of the load is being varied.

☆ ☆



Metal-Spraying Method

2,423,490. RICHARD ERHARDT, Chicago. Filed May 20, 1944. Issued July 8, 1947.

An improvement upon the metal-spraying process which comprises blanketing of the projected spray stream circumferentially beyond the melting zone with a sheath of hydrogen at low pressure and velocity. Hydrogen flow is parallel to the spray stream.

☆ ☆

Magnetic-Testing Apparatus

2,423,552. JOHN E. CLARKE, Chicago, assigned to MAGNAFLUX CORP., Chicago. Filed Sept. 10, 1941, and May 28, 1942. Issued July 8, 1947.

In combination, a contact prod having an auxiliary switch, an abutment of conducting material engageable by the prod, a source of alternating current, rectifier means, a first circuit connecting rectifier with prod and the abutment of conducting rectifier with current source, a main switch in connection with second circuit motor connected to operate main switch, a third circuit connecting auxiliary switch with motor, an impedance, and timing means operably connected with the third circuit to automatically insert the impedance in the second circuit.

OAKITE Pre-Cleaning Cuts Rejects!

It's a fact that successful welding importantly depends on proper pre-cleaning of surfaces. Take the job of welding aluminum, for example: You can speed up aluminum weld production and reduce rejects if first you chemically deoxidize aluminum surfaces with specialized Oakite materials. Oakite aluminum-cleaning materials speedily and thoroughly remove oils, grease and shop dirt . . . pave the way for best welds.

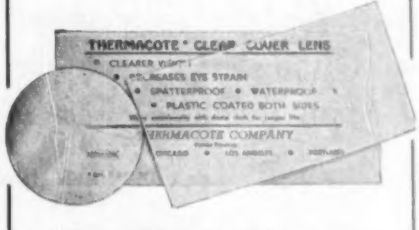
Application details about Oakite aluminum-cleaning materials and methods—yours FREE. Just get in touch with your nearby Oakite Technical Service Representative for his on-the-spot advice.

OAKITE PRODUCTS, INC.
75 Thames Street, NEW YORK 6, N. Y.
Technical Representatives in Principal Cities of U. S. & Canada

OAKITE

Specialized Industrial Cleaning
MATERIALS • METHODS • SERVICE

PREFERRED BY ALL WELDERS WHO KNOW THEM


THERMACOTE • CLEAR COVER LENS
• CLEARER VISION
• REDUCES EYE STRAIN
• SPATTERPROOF • WATERPROOF
• PLASTIC COATED BOTH SIDES
THERMACOTE COMPANY
CHICAGO • LOS ANGELES • PORTLAND

THERMACOTE PLASTIC COATED COVER LENSES

Slag-proof and water-proof outlast ordinary cover glasses 25 to 1. Preferred by welders because they insure constantly clear vision and save eye strain. Send for free samples.

THERMACOTE CO.

Newark, N. J. Los Angeles, Calif.
Chicago, Ill. Portland, Ore.

"ANTI-BORAX"
FLUXES

SO IMPORTANT . . . . .
YET COST SO LITTLE

"Anti-Borax" Fluxes are GOOD . . . they are GUARANTEED. For best results in welding cast iron, brass, bronze, malleable iron, stainless steel, and aluminum use "ANTI-BORAX" Fluxes.

- No. 1 Cast Iron Welding Flux
- No. 2 Brazing Flux for Brass, Bronze, etc.
- No. 4 "Brass-Cast" Flux for Bronze Welding Cast Iron
- No. 5 Aluminum Flux for Cast Aluminum
- No. 8 Aluminum Flux for Sheet Aluminum
- No. 9 Stainless Steel Welding Flux
- No. 11 Tinning Compound
- No. 16 Silver Solder Paste Flux

Send for free samples

Manufactured only by

ANTI-BORAX COMPOUND CO.
FORT WAYNE, IND.

ELECTROLOY

for BUTT, FLASH, PROJECTION, SPOT and SEAM WELDING ELECTRODES

Ask for our NEW catalog covering the MOST COMPLETE LINE OF RESISTANCE WELDING ACCESSORIES.

THE ELECTROLOY CO., INC.
1600 Seaview Ave.
BRIDGEPORT, CONN.

Soldering Iron

2,423,900. ROYDEN W. PARKER, Haddonfield, N. J. Filed Feb. 27, 1945. Issued July 15, 1947.

An electrically heated soldering iron having a tubular frame provided with a slotway and a hand grip. A hollow bit mounted on the end of the frame opposite the handgrip provides a reservoir for the supply of solder. The interior of the bit is in open communication with the bore in the frame and with an aperture opening through the tip of the bit. Heating element is within the bit. A tubular pusher slidably mounted in the bore of the frame connects the heating element at its forward end; leads extend rearwardly through the bore of said pusher member for connection with a source of current supply. Moving of pusher member forwardly in the frame causes heating element to force-feed molten solder outwardly through the aperture in the tip. The means for moving the pusher takes the form of a thumb piece slidably mounted in the slotway.

☆ ☆

Soldering Iron

2,424,848. JOHN A. REITAN, Minneapolis, Minn., assigned to MET-ELEC CORP., Minneapolis. Filed Dec. 13, 1944. Issued July 29, 1947.

In a soldering iron having a tip on one end of a barrel member, a chamber in the tip opens at one end into the barrel member which also has a tubular insulating member. A contact rod moves endwise through the insulating member and axially of the barrel. Heating element is slidably, mounted at one end in the insulating member and extends axially into the tip chamber, the arrangement being such that the heating element is normally free for axial movement with respect to the tip and contact rod.

☆ ☆

Weldor's Head Shield

2,420,619. JOSEPH F. RAKOS, Cleveland, O., assigned one-half to JOHN W. NELSON, Cleveland. Filed Dec. 14, 1945. Issued May 13, 1947.

A head shield that has a foundation member connected thereto, a window hinged to the foundation member by a hinge pin, a coiled spring in torsion on the hinge pin and a transverse member connected to the upper edge of the window. The transverse member has a longitudinally extending bore, in each end of which a bail is mounted. A window-lifting member hinged to the bail has downwardly extending legs held in spaced relationship by parallel transverse members. Other elements include a back plate having a guideway therein, a stop positioned at the upper end of the guideway, an adjustably mounted stop positioned in the guideway at its lower end, a carrier member slidably mounted in the guideway and limited in its movement up and down by the stops, a releasable lifting member operating member yieldingly mounted in the carrier member, a manually operable lever pivotally mounted on the back plate.

THE ELGIN
AC ARC WELDER

Does MORE work at LOWER cost

New design improvements and operating features make the ELGIN your answer to *low operating costs, maintenance savings.* Easy to start and to operate. Cool in operation. 4 models . . . 150, 200, 250, and 350 amps.

John Ruskin said:

"There is hardly anything in this world that some man cannot make a little worse and sell a little cheaper and the people who consider price only are this man's lawful prey."

INVESTIGATE ELGIN!
Write today for Details!

LEFT
The ELGIN Model "G" Pneumatic Hammer
Lightweight, compact, sturdy. Locks tools into chuck. Minimum vibration.

RIGHT
The ELGIN Electric Brazing Torch
Connects to welder for brazing, preheating, many other uses. Economical to operate —substantially constructed.

- Distributors inquiries invited.

BORM
MANUFACTURING COMPANY
Elgin, Ill., U.S.A.

OPPORTUNITIES FOR WELDING

Plate, Pipe and Tank–Structural–Buildings–Repairs and Hard-Facing

●Projects $500,000 and more in value.
†Federal Government Projects.

Plate Welding Pipe & Tank

Low Bidder

●†**California**—PIPES, TANK—Bureau Reclamation, Dpt. Interior, Customhouse, Denver, Colo., June 23, pump discharge pipes and surge tanks for Tracy Pump. Plant, Central Valley Proj., Spec. 1856, from Southwest Welding and Mfg. Co., Alhambra. **$2,228,000**

Contract Awarded

●**California**—TUNNEL—Pacific Gas & Electric Co., 245 Market St., San Francisco, first 3,000 ft. section of ultimate 21,054 ft. of 26 ft. tunnel on north fork of Feather River, near Cresta, Butte Co., to T. E. Connolly, Inc., 461 Market St., San Francisco, **$1,081,762.**

Low Bidder

●**Calif., Los Angeles**—STEAM PLANT—Los Angeles Water & Power Dpt., 311 N. Spring St., main bldg. superstructures for Units 3, 4 and 5, transformer foundations, cable tunnel from Control House to main bldg., at Harbor Steam Plant, Island Ave. and B St., Wilmington, Spec. 9943, from Guy F. Atkinson Co., 22233 S. Santa Fe Ave., P.O. Box 259, Long Beach. **$1,916,667.**

Low Bidder

Calif., Oakland—PIPELINE—East Bay Utility Dist., 512 16 St., Aug. 13, installing approx. 8,700 lin. ft. 36 in. diam. cement mortar lined and coated welded steel pipeline and appurtenances, removing equivalent length 30 and 36 in. diam. concrete pipe, etc. in existing Morga Aqueduct, Spec. 76, from McGuire & Hester, 796 66 Ave., Oakland. **$89,092.**

Contract Awarded

●**Calif., San Francisco**—SUPPLY LINE—Public Utilities Comm., City Hall, 60 in. Sunset supply line from Colma to Sunset Reservoir, Spec. 452, to M. & K. Corp., 200 Financial Center Bldg. **$667,279.**

Contract Awarded

●**Illinois and Michigan**—GAS PIPELINE—Michigan-Wisconsin Pipeline Co., 105 W. Adams St., Chicago, Ill., 250 mi. 22 in. natural gas pipeline between Millbrook, Ill. to near Detroit, Mich., to Ford, Bacon & Davis, 39 Broadway, New York, N. Y. **$13,500,000.**

Contract Awarded

●**Kan., Kansas City** — PLANT — Phillips Petroleum Co., Bartlesville, Okla., 2 story, 300x500 ft., brick, steel, concrete plant, to Winn-Senter Constr. Co., Railway Exchange. Over **$500,000.** C. W. Hubbell, c/o owner, engr.

Contract Awarded

Louisiana — GAS PIPELINE — Anchor Gasoline Co., Atlas Life Bldg., Tulsa, Okla., 35 mi. 6 in. gas pipeline between Church Point and Eola. Owner builds. **$325,000.**

Contract Awarded

●**Mont., Billings**—REFINERY—Continental Oil Co., Philtower Bldg., Tulsa, Okla., refinery, to Jones & Laughlin Supply Co., 108 N. Trenton St., Tulsa, Okla. **$8,500,000.**

Contract Awarded

●**New Mexico and Arizona**—GAS PIPELINE—El Paso Natural Gas Co., Bassett Tower, El Paso, Tex., 12 in. natural gas pipeline between Jal and Phoenix at Tucson, Ariz. Owner builds. **$3,323,000.**

Low Bidder

Pa., Cresson—TANK—Dpt. Property & Supplies, 18 and Herr Sts., Harrisburg, August 20. WW imprvs. at Tuberculosis Sanatorium, steel elevated water tank from Pittsburgh-DesMoines Steel Co., Neville Island, Pittsburgh, **$48,750;** rein.-con. reservoir covers from Means Bros., Swartz Bldg., Punxsutawney, **$19,880;** sludge bed cover, from Moyer Bros., 2605 Beale Ave., Altoona, **$35,640.**

Contract Awarded

Tenn., Lafayette — SUPPLY SYSTEM — Town, WW supply and distr. sys., to C. E. Moore Co., Greenwood. **$150,000.** Hart, Freeland & Roberts, 3 Natl. Bank Bldg., Nashville, engrs. and archts. Awarded 7/30.

Contract Awarded

Texas—PIPELINE—Lone Star Gas Co., 1915 Wood St., Dallas, 35 mi. 6 in. pipeline from near Miles to near Eden, to Ladwig Constr. Co., Corpus Christi. **$278,000.**

Contract Awarded

Texas—GAS PIPELINE—Frio Pipe Line Co., Scanlan Bldg., 50 mi. 6 in. natural gas pipeline between Pearsall and point in Zavalla Co. Owner builds. Approx. **$475,000.**

Low Bidder

●**Va., Suffolk**—REFINERY, etc.—Planters Nut & Chocolate Co., Suffolk, refinery and packing plant, from Virginia Eng. Co., Melson Bldg., Newport News. **$583,000.**

Contract Awarded

●**Wash., Seattle**—PIPELINE—City, County—City Bldg., 3 and James St., Zone 4, replacing section of Cedar River pipeline with 27,120 ft. 66 in. welded steel pipe from Augusta St. north to Beacon Hill reservoir to Valley Constr. Co., 7708 Rainier Ave. **$1,011,530.** Bids 7/10.

Low Bidder

Wash., Tacoma — WELDING JOINTS — City, City Hall, August 6, welding 640 field joints in 58 in. steel supply main from Bond Welding Co., 1013 E. E. St. **$30,120.** A. W. Kunigk, water Supt.

Low Bidder

Wash., Westport—TANK—Town, Town Hall, water sys. rein.-con. filter in booster pumphouse, from Grays Harbor Constr. Co., Aberdeen, **$35,344** *** 100,000 gal. elevated steel tank, from Chicago Bridge & Iron Co., 22 Battery St., San Francisco, Calif., **$47,380** *** laying pipe, from Thorburn & Logozo, 4608 36 Ave., S.W., Seattle, **$100,272.**

Structural Bridges and Other

Contract Awarded

●**California** — SUPERSTRUCTURE — State Div. Hys., Sacramento, superstructure for overhead structure, Alameda Co., to J. H. Pomeroy & Co., Inc., 333 Montgomery St., San Francisco. **$646,322.** Bids 8/6, awarded 8/13. CD 8/11—ENR 8/14.

Contract Awarded

●**California** — BRIDGE SUPERSTRUCTURES—State Div. Hys., Sacramento, superstructures, approaches San Mateo Co., to Carrico & Gautier, 365 Ocean Ave., San Francisco. **$989,150.** Bids 7/30, awarded 8/7.

Low Bidder

●**California** — BRIDGE SUPERSTRUCTURE—State Div. Hys., Sacramento, Aug. 13, superstructure overhead crossing, Santa Barbara Co., from Carl N. Swenson Co., 1095 Stockton Ave., San Jose. **$527,522.**

Contract Awarded

●**Colo., Denver** — DRAINAGE BASIN — Bd. Water Comrs., Denver, constructing Capitol Hill Reservoir Drainage Basin, to J. T. McDowell & Sons, First National Bank Bldg. **$566,694.** Bids 8/4.

Contract Awarded

Ga., Decatur—STADIUM—Decatur City School Bd., Decatur, stadium at Boy's High, to Searcy B. Slack, 420 Clairmont Ave. **$100,000.** Low Bidder reported WE Sept. p. 100.

Contract Awarded

●**Illinois and Missouri**—BRIDGE—City of East St. Louis, City Hall, Main St. and Missouri Ave., July 21, 7,700 ft. rein.-con. steel cantilever type vehicular and pedestrian bridge over Mississippi River from 3 St. and St. Louis Ave., East St. Louis, Ill. to 3 St. and Franklin Ave., St. Louis, Mo., to William J. Howard, Inc., 25 E. Wacker Drive, Chicago, Zone 1, Ill., **$6,490,000.** Est. $5,500,000.

Low Bidder

Kansas—SUPERSTRUCTURE—State Hy. Comm., El Dorado, imprv. superstructure Proj. F-124 (5), Butler Co., from Rhoades Constr. Co., Newton, **$89,769.**

Low Bidder

Louisiana—BRIDGES—State Hy. Dpt., Baton Rouge, Aug. 6, bridges Livingston Parish, from W. R. Aldrich & Co., Kalurah University Gardens, Baton Rouge, **$188,819.** CD 7/2—ENR 7/10; Madison Parish from Carruth Contg. Co., Louisiana National Bank Bldg., Baton Rouge, **$69,139.**

Rejected Bid

●**Mich., Sault Ste. Marie**—BRIDGE—Sault Ste. Marie Bridge Co., Sault Ste. Marie, rejected bids June 24, vertical lift span bridge across South Canal. L.B. $1,599,946. Low Bidder reported W. E. Spt., p. 100.

Contract Awarded

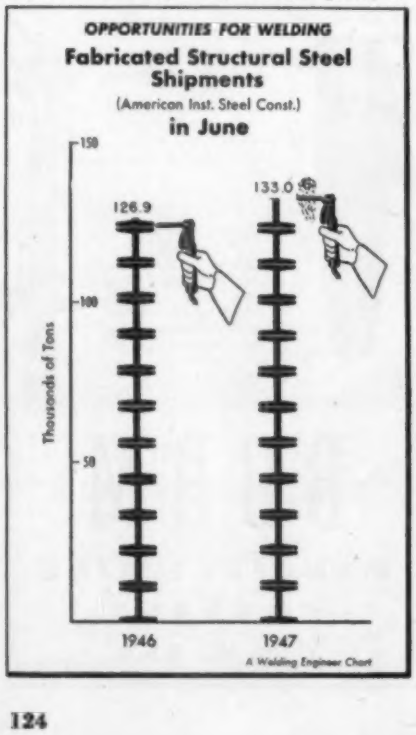
Missouri—BRIDGE—State Hy. Dpt., Jefferson City, bridge Warren Co. to Condon Cunningham Co., 4229 Lafayette St., Omaha, Neb. **$96,855.** Bids 7/11, awarded 8/9.

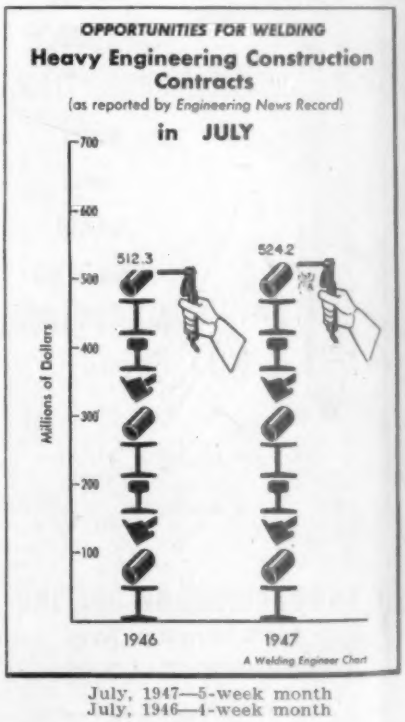
Low Bidder

●**New Jersey**—VIADUCT—State Hy. Dpt., Trenton, Aug. 7, viaduct over Pennsylvania and Lehigh Valley R. R. on Rte. 25, Essex Co., from Franklin Contg. Co., 12 Central Ave., Newark, **$1,932,353.**

Low Bidder

●**New Jersey**—BRIDGES—State Hy. Dpt., Trenton, Aug. 1, bridges Route 25, Sect. 34, Essex Co., from Union Building & Constr. Co., Corp., 631 Main St., Passaic. **$689,912.** Received no bids Aug. 1, bridges, Essex Co.





July, 1947—5-week month
July, 1946—4-week month